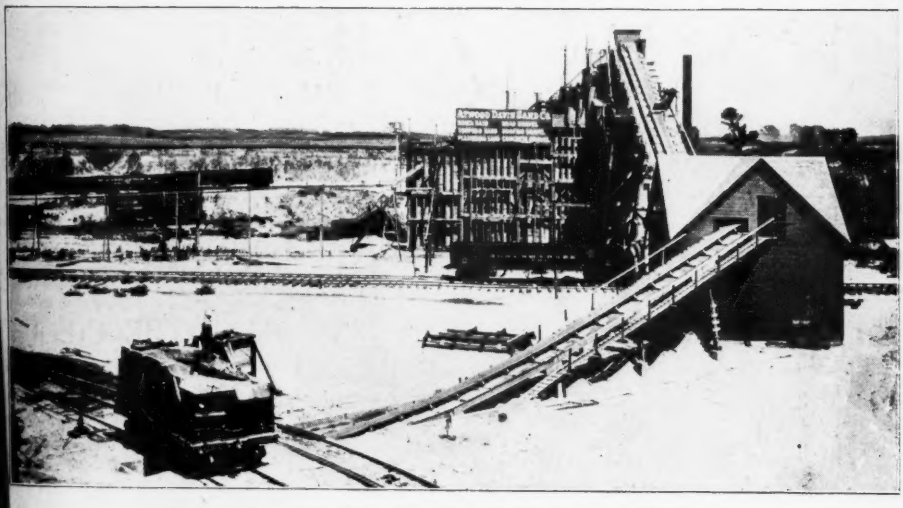
Pit and Quarry

SAND • GRAVEL • STONE

HANDLING • CRUSHING • SCREENING • WASHING

This Plant Cut Down Operating Expense by continuous use of

Rexall Double Stitched Conveyor Belting



WHY NOT INVESTIGATE REXALL'S SUPERIORITY?

Manufactured By

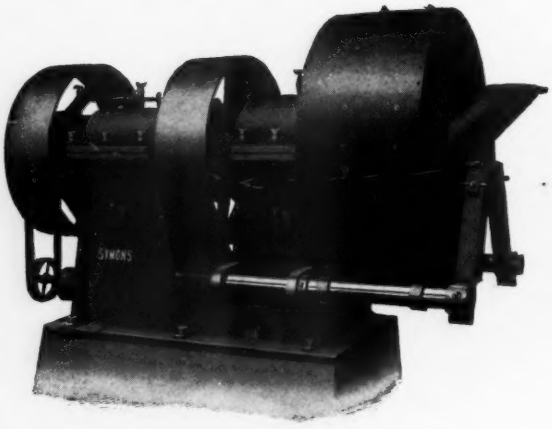
Imperial Belting Co.

Sales Offices 42 Broadway, New York; 423 Yeon Bldg., Portland, Ore.; 526 Market St., San Francisco

LINCOLN AND KINZIE STREETS, Chicago

JULY 1917

Symons Disc Crusher



THE IDEAL CRUSHER FOR GRAVEL, SAND, ROCK

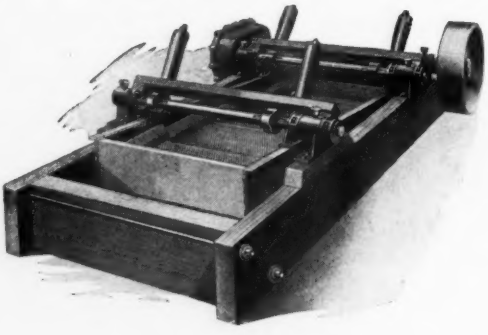
Large Capacity Uniform Size.

In Operation in Nearly Every State

BUILT IN FOLLOWING SIZES.

Size	18 inches	Capacity	5 to 15	Tons	Per	Hour
"	24 "	"	12 to 30	"	"	"
"	36 "	"	25 to 65	"	"	"
"	48 "	"	45 to 120	"	"	"

Simons Pulsating Screens



HALF THE COST OF A REVOLVING SCREEN

Larger Capacity
Less Repairs
Less Floor Space

MANUFACTURED AND SOLD ONLY BY

CHALMERS & WILLIAMS

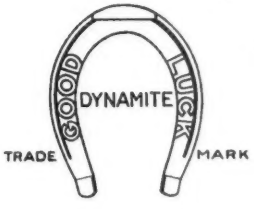
1500 ARNOLD STREET

Chicago Heights, Illinois

BURTON
POWDER COMPANY

Manufacturers of

DYNAMITES
PERMISSIBLES
BLACK POWDER



Distributing Points:

Joliet, Ill.	Columbus, Ohio
Cumberland, Md.	Fostoria, Ohio
Grand Rapids, Mich.	Lowellville, Ohio
Saginaw, Mich.	New Castle, Penn.
Ravena, N. Y.	Clarksburg, W. Va
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Use No Power
Save Your Money
with the
SELLAR
GRAVEL WASHER

WASHED AND SCOURED

The Sellar Gravel Washer requires no power. Gravity runs it, and therefore the cost of operation is no more than that of supplying the washer with water and gravel. The initial outlay is small.

EFFICIENT The Sellar Gravel Washer is simply a flume with a metal false bottom with Johnson Non-Clogging Perforations and a solid metal bottom that carries the sand and silt. It is set at a slant of 1 inch fall per foot. The gravel is let in at the high end and washed down through the flume with water. The sand falls through the perforations; the gravel remains in the upper section. In rolling through the flume and passing through the water, the gravel is perfectly scoured and washed.

The Johnson Non-Clogging Screen

PORTABLE The Sellar Gravel Washer is a model of portability. It is made in 8-foot sections, and operates efficiently in 16, 24, 32 ft. combinations, etc. It's just the thing for washing on the job; saving the difference in price between washed and unwashed gravel. Though very strong, it is not heavy.

BIG CAPACITY With a standard screen and a water supply of 400 gallons per minute the Sellar will wash 150 tons a day.

DURABLE The Sellar Gravel Washer is all steel. It has no moving parts to wear out and cause trouble. In short, it is the greatest little gravel washer ever produced.

Write us for particulars

SELLAR SUPPLY COMPANY

Everything for Pit and Quarry Operators

557-559 West Quincy Street CHICAGO, ILL.

Probably you have never fully appreciated the immense economical value of

TRADE MARK

Oxweld

EQUIPMENT

to Pit or Quarry Operators

FIND OUT!

Breakage of crushers, hoists, pumps, shovels, washing and screening mechanism may be quickly and inexpensively repaired with the Oxweld Welding Blow Pipe. The illustration above shows a Centre Casting from a Steam Shovel being repaired; its cost to replace would have been $300, its cost to repair with Oxweld equipment was considerably less than one-tenth that amount.

You may benefit by Oxweld efficiency, either through equipping yourself or by taking advantage of our repair stations at Chicago and Newark, N. J., the two largest in the Untied States. We shall be pleased to send you particulars regarding both methods, on request. Ask for Bulletin 508.

OXWELD ACETYLENE COMPANY

NEWARK, N. J. CHICAGO LOS ANGELES

HERCULES EXPLOSIVES

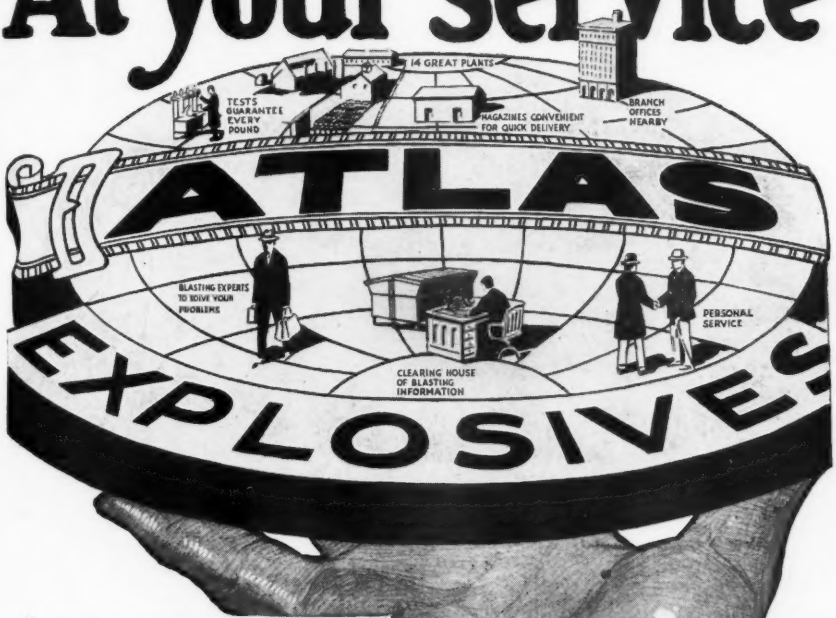
For the Sake of Economy

During the last two years such radical changes in the cost of explosives have taken place that practices which formerly were considered the best and the most economical have been superseded.

It is possible in view of these changes that experimentation with dynamites other than those you are now using would result in economy. A competent explosives engineer, in consultation with your expert, might shed a new light on the subject In this connection our services are at your disposal. We may be able to save you money if given the opportunity

HERCULES POWDER CO.
Wilmington Delaware

At your service



"AT your service" might be considered the ATLAS slogan. It expresses the spirit which permeates every department, yes every man, in our nation-wide organization.

We have the benefit of more than a century's experience in making explosives. Through our service department, which is the mouth-piece for expressing the co-operation of our entire organization, all of this century's experience is at the disposal of *any man* who has blasting to do.

We are confident that if you will but utilize this personal ATLAS service—

First: Your blasting will be done better.
Second: Your blasting will be done more economically.
Third: You will be glad you put your blasting problems up to us.

ATLAS POWDER COMPANY

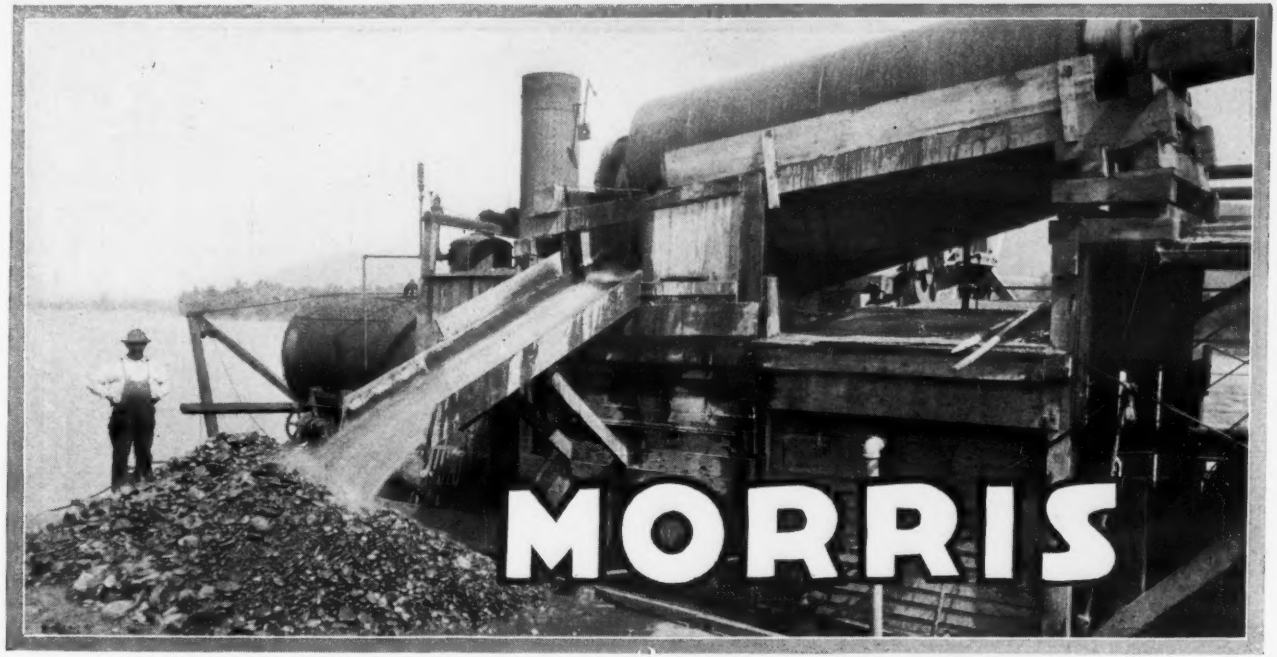
Home Office, Wilmington, Del.

SALES OFFICES: Allentown (Pa.), Birmingham (Ala.), Boston, Chicago, Houghton (Mich.), Joplin (Mo.), Kansas City, Knoxville, McAlester (Okla.), Nashville, New Orleans, New York, Philadelphia, Pittsburg (Kan.), Pittsburgh (Pa.), Pottsville (Pa.), St. Louis, Wilkes-Barre (Pa.).

A PROPER EXPLOSIVE FOR EVERY BLASTING REQUIREMENT

Put Your Blasting Problems Up to Us

Our Service Department is a clearing house of blasting experience in all its phases and under all conditions. It is directed by experts who will personally help you apply this vast store of information to your own *blasting*. WRITE TODAY.

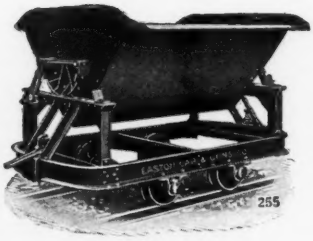


Plant of D. N. Thomas Sand & Gravel Co., Williamsport, Pa.

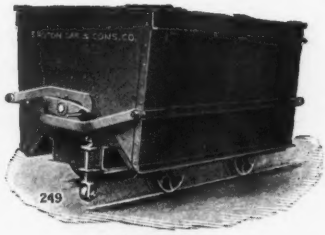
Produced 60,000 cu. yds. in two seasons without one cent for repairs

THEY USE MORRIS PUMPS—DO YOU? MORRIS MACHINE WORKS, Baldwinsville, N. Y.

EASTON CARS



Rocker Dump



Gable Bottom

For Pit and Quarry Service

TURNTABLES, Tracks, Ties, Switches and other Accessories are also included in the comprehensive EASTON LINE of industrial Railway Cars and Equipment. We build and carry in stock all standard types of Industrial Cars and also construct special cars for any service from the designs of either your engineers or our own.

Call upon our engineering department for any assistance or data. It will be given freely, promptly and gladly. Twenty-five years' manufacturing and installation experience is at your command.

Tell us the kind of work for which you need cars and we will send Illustrated Specifications describing suitable types

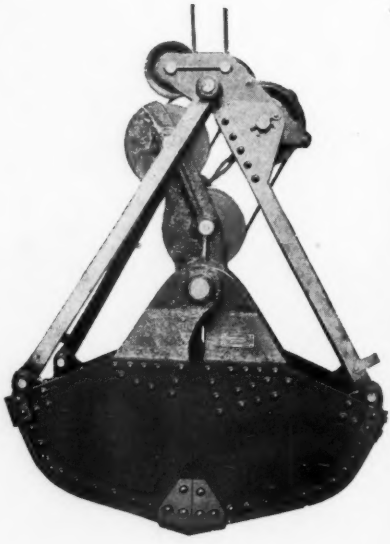
EASTON CAR & CONSTRUCTION CO.

24 Center Square

EASTON - PENNA.

Long Life and Efficient Service are Characteristics of the

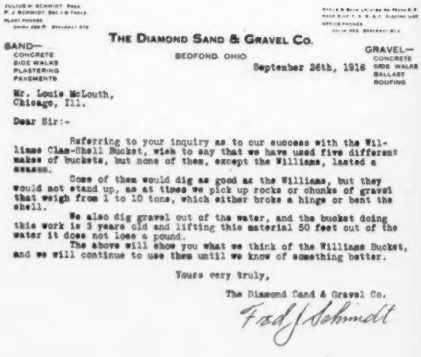
WILLIAMS BUCKETS



because they are built of steel on designs which embody the right mechanical principle.

Simple in construction; bearings, few and extra large; all sheaves bronze bushed; cables perfectly guarded; alignment of sheaves exact at all times; scoops heavily reinforced and so constructed that there is absolutely no side movement; powerful and speedy closing arrangements.

—These are a few of the features that help to make our repair part business so small.



THE DIAMOND SAND & GRAVEL CO.
BEDFORD, OHIO

SAND— CONCRETE SIDE WALKS PLASTERING PAVEMENTS

GRAVEL— CONCRETE SIDE WALKS BALLAST ROOFING

September 26th, 1916

Mr. Louis McLouth,
Chicago, Ill.

Dear Sir:-

Referring to your inquiry as to our success with the Williams Clam-Shell Bucket, wish to say that we have used five different makes of buckets, but none of them, except the Williams, lasted a season.

Some of them would dig as good as the Williams, but they would not stand up, as at times we pick up rocks or chunks of gravel that weigh from 1 to 10 tons, which either broke a hinge or bent the shell.

We also dig gravel out of the water, and the bucket doing this work is 3 years old and lifting this material 50 feet out of the water it does not lose a pound.

The above will show you what we think of the Williams Bucket, and we will continue to use them until we know of something better.

Yours very truly,

The Diamond Sand & Gravel Co.

Fred J. Schmidt

Built in Types and Sizes for Every Purpose

Catalog by Return Mail on Request

THE G. H. WILLIAMS CO.

General Office and Works, ERIE, PA.

GRIT

in your material which cuts the main bearings of the usual type of grab never touches the bearings of the latest type

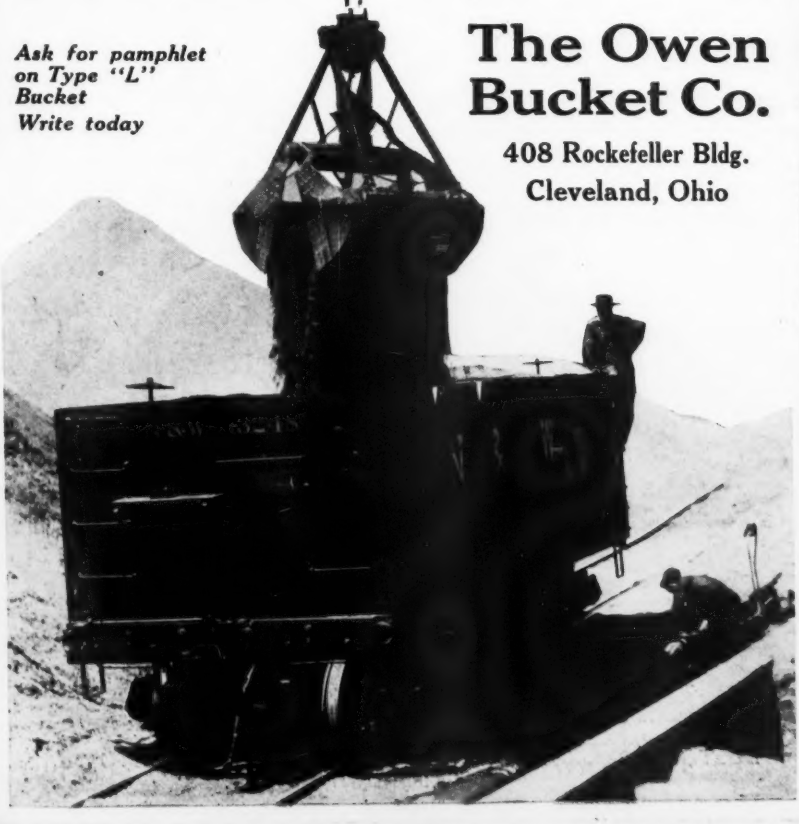
Owen Buckets

The "Owen" method of protection and lubrication of the main bearings keeps them clean at all times. An exclusive feature which alone insures a longer life of useful service with less repairs than is possible with any other construction.

Ask for pamphlet on Type "L" Bucket
Write today

The Owen Bucket Co.

408 Rockefeller Bldg.
Cleveland, Ohio



The Most Economical and Durable Pulverizer For All Purposes

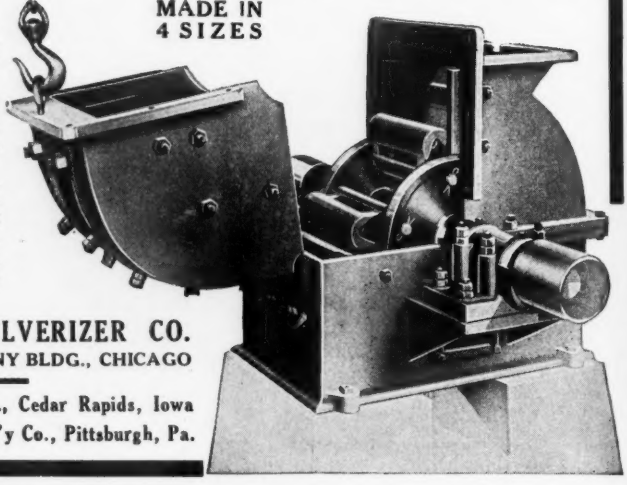
IT WILL PAY YOU TO INVESTIGATE

The Brainard Crusher Pulverizer

1—Saves 50 per cent. maintainence cost.
2—Eliminates screen troubles.
3—Saves cost of one machine — as the **Brainard** is a crusher and pulverizer combined.
4—Saves time—designed so that every working part is easily accessible.

Our Engineering Department solicits your inquiries.

MADE IN 4 SIZES



BRAINARD PULVERIZER CO.
330-335 OLD COLONY BLDG., CHICAGO

Universal Crusher Co., Cedar Rapids, Iowa
Geo. C. Videtto Mach'y Co., Pittsburgh, Pa.

Agricultural Limestone

Is economically produced in large quantities with either

The Bradley Hercules Mill

—or—

The Bradley Three Roll Mill

Many of the largest Agricultural Limestone Producers use these machines—They produce a very finely ground finished product in single operation without use of auxiliary machinery.

Send For Catalog and Full Information **We Can Solve Your Grinding Problem**

Bradley Pulverizer Co.

BOSTON LONDON Works: ALLENTOWN, PA.

TRAYLOR
GYRATORY CRUSHERS

Combine more Good Features than any other Gyratory built

An extra large Eccentric, greater in diameter and longer than others.
A shaft 25% larger in diameter than others.
A perfect all-steel suspension at the point of least motion, giving a perfect rolling motion to the shaft.
Lubricating system that forces all dirt from the eccentric cavity, assures a cool running and long lived eccentric.
These and many other points of superiority assure you of the

MAXIMUM OUTPUT

Bulletin G-3 will interest you. Send for it.

Traylor Engineering & Manufacturing Co.

Main Office and Works:
Allentown, Pa., U. S. A.

New York Office: 30 Church Street
Chicago Office: 1414 Fisher Building
Western Office: Salt Lake City, Utah

Ideal Sand and Gravel Excavator

THE Ideal Sand and Gravel Excavator is designed to displace expensive labor in excavating material from sand and gravel banks, and conveying it to the discharging point.

With this equipment every one operating a pit can greatly reduce the cost of excavating the sand or gravel, and the expense of getting it to the screen.

Write to-day and get complete details and prices of this efficient, money saving outfit.

IDEAL ENGINE COMPANY

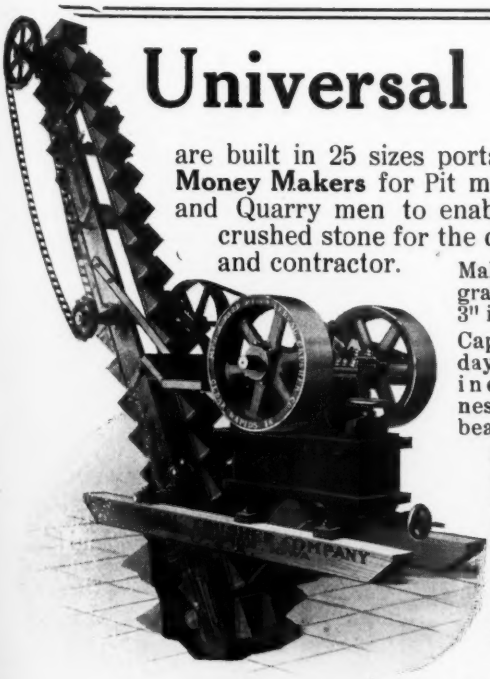
R. E. OLDS, Chairman

640 E. Kalamazoo Street

IDEAL CONSTANT SERVICE POWER

LANSING, MICH.

Universal Crushers



are built in 25 sizes portable or stationary, and are **Money Makers** for Pit men to crush their oversize and Quarry men to enable them to produce small crushed stone for the concrete man, road builder and contractor.

Makes a product from oversize gravel or Quarry rock from ¼ to 3" in one operation.

Capacities from 5 to 300 tons per day. Jaw openings 5x6 to 14x24 inches equipped with manganese jaws and removable bronze bearings.

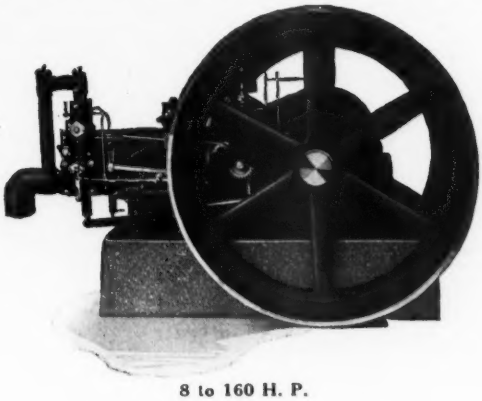
Send for Catalogue of full line of Universal and Eureka crushers, rolls for fine grinding, Elevators and screens of all sizes, also full line of Universal Brainard Pulverizers.

UNIVERSAL CRUSHER CO.
200 Third Street, Cedar Rapids
Iowa, U. S. A.

CHARTER OIL ENGINES

Will pump your water, wash your sand and gravel, crush your rock and stone, at less cost than you can possibly do it for by using steam or electricity

The Logical Power for Isolated Plants



Operate on Low Priced Fuels

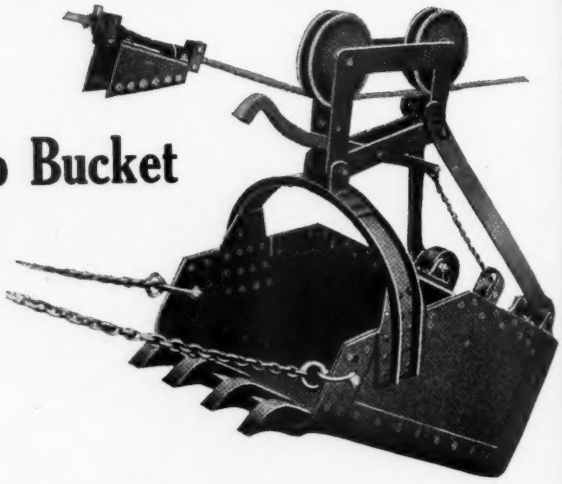
8 to 160 H. P.

Catalogs Upon Request

CHARTER GAS ENGINE COMPANY

10-96 FIRST AVENUE STERLING, ILLINOIS

The Pioneer Back Dump Bucket



for slack cable excavation of sand and gravel, as well as miscellaneous excavation.

Our booklet "PIONEER EXCAVATING OUTFITS" is free, send for it.

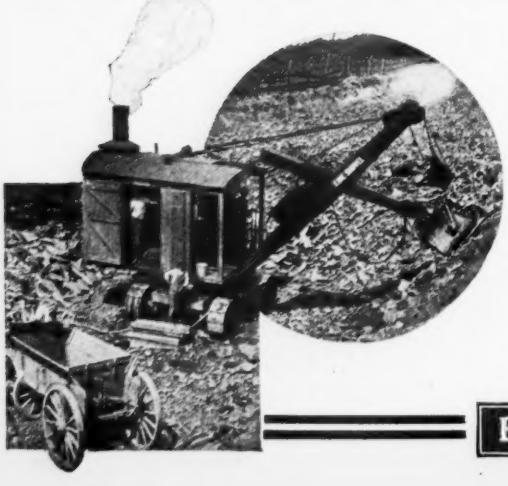
The Mansfield Engineering Co.

Fletcher Trust and Savings Bldg. Indianapolis, Indiana

Erie Revolving Shovels

Just ask experienced shovel owners:

'Which is the best revolving shovel?"



Ask the York Hill Trap Rock Quarry Co., of Meriden, Conn., or the Susquehanna Stone Co., of Williamsport, Pa., or ANY owner who has had several shovel experiences—and then bought the Erie.

Ask these owners which shovel has given the biggest output on hard rock work. Which machine has proven most *reliable* Which shows the strongest construction at all points of wear and strain?

Write for addresses of Erie owners near you—also for a copy of our new Bulletin "Q."

Ball Engine Co., Erie, Pa.

Pit and Quarry

Vol. I **JULY, 1917** **No. 5**

A Bi-Monthly Journal for Producers and Marketers of Sand, Gravel and Stone.

Subscription Price $1.00 *Per Year.*

Address Pit and Quarry, 527 S. La Salle St., Chicago. Tel. Harrison 6729.

The Ohio Macadam Association sent a delegation to Washington to confer with the authorities regarding road construction, car service and the coal problem. The courtesy with which they were received by Mr. Daniel Willard, Mr. Hodges, and the Department of Public Highways indicates that there is an earnest purpose to keep the wheels of industry moving. The road construction in which federal aid is involved will continue, and already the price of coal has been reduced. The car shortage is being met by the endeavor of everyone to help. Our readers can help by seeing that cars are unloaded promptly and filled to capacity by shippers. It might be well to arrange for limit loads rather than the minimum amount specified by the railroad company. This will hardly be a hardship on anyone, as a few yards of sand, gravel or stone will occupy little space, and will come handy sometime.

A decrease in building is perhaps fortunate in some respects for it would be difficult to supply materials were building brisk. Many pits and quarries are working at a fraction of their capacity, owing to the shortage of cars, and it would be a misfortune to have contractors and builders calling for more material than could be furnished. Should there be an early resumption of building the material man who finds his bins empty will be in an uncomfortable position.

Do you know that for the asking you can obtain posters and photographs to be placed around your office and plant, from some casualty and insurance companies, warning men against carelessness in operating machines and in mining and quarrying? Such posters mean the prevention of accidents. Safety first should ever be kept in mind in operating quarries. It means the protection of limb and body. It means the saving of money to the quarryman.

Clean, hard gravel for roads makes an excellent wearing surface for many kinds of traffic, but it is very difficult to make it bind.

A few years ago one of the editors of this journal had to build a road of hard, clean gravel, varying in size up to about one and a half inch. It was found to be almost impossible to make this pack. It was quickly cut up by the vehicles making ruts in the gravel. The rapidly moving automobiles scattered it on the sides of the road, and teams could hardly pull through it.

These conditions were remedied both easily and cheaply. To a layer of six inches of the gravel a layer from one and a half to two inches of sandy clay was added. Then a road machine was used to throw the two materials from the sides of the road into a windrow in the center. This partly mixed the two and as the road machine

spread it out over the road surface the mixing was completed. A little hard dressing and some light rolling gave a smooth, hard road that has given excellent service with but little maintenance. Gravel is helping to solve our road problem in many sections of the country. Owners of gravel pits should instruct engineers as to uses of gravel and how to overcome any objectionable features.

In view of existing conditions, the Cement Products Exhibition Co., which has held the Annual Cement Show in Chicago for the last ten years, has decided to hold no Show next winter.

It is possible circumstances will make the Show possible, in which event our readers will be promptly informed. The Show has proven so valuable in the past that it is a matter of regret that it must be omitted even for one year.

While it is advisable to use local materials wherever possible, there are often objections. When the best is required, no one will consider using loamy or dirty sand or gravel. Nor will they use "bank-run" just because the pit-owner lacks the foresight to put in suitable screens.

In many cases the pit-owner can be induced to provide proper facilities for washing, crushing, screening and grading and this is perhaps the most logical thing to do. In other cases, however, the contractor must provide his own equipment, and he has a wider range to work on. The result is he can purchase sand and gravel at a lower price than if the pit were up-to-date.

S. M. Williams, sales manager of the Garford Truck Co., devotes a good part of his time to furthering good roads. He recently said:

"Never was there a time in the history of our country when good roads were of such paramount importance. The war in Europe has demonstrated most fully that one of the best assets of a fighting nation is improved highways. So much has already been said along this line that it is but a waste of time to go further into the advantages of good roads in a warring country.

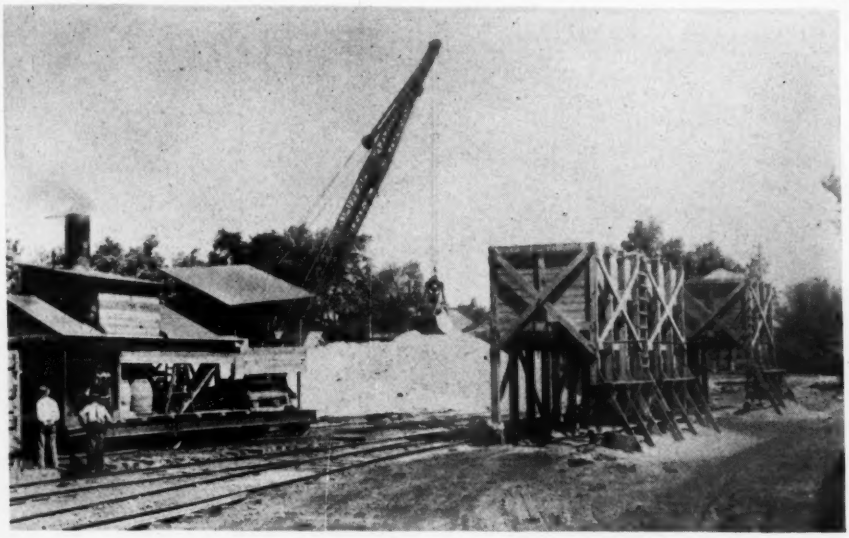
"Just as the United States has always led the world progress, so should it lead in its highway development, irrespective of war conditions. However, unless we pay close attention to the good roads situation, we will find that many other nations have surpassed us in that branch of civic improvement and industrial development."

Unloading Plant of the Nash-Dowdle Co., Evanston, Ill.

Economy must be practiced by the contractor these days, and the Nash-Dowdle Co., building the tunnels for the North Shore Interceptor sewer through Evanston, Ill., have built a model plant for the rapid handling of sand and gravel.

Two track switches enter the yard, giving space for perhaps a dozen cars without crowding. These are joined just before reaching the Sunbury bins shown in the illustrations. Whatever switching is necessary is done by the Mundie Hoisting Engine mounted on a channel frame platform and moving forward and back on a track of 9-inch channels.

The sand and gravel are unloaded from the cars by an Owen Clamshell bucket, working on a 50-foot boom. This enables the engineer to load directly into any of the three bins, or

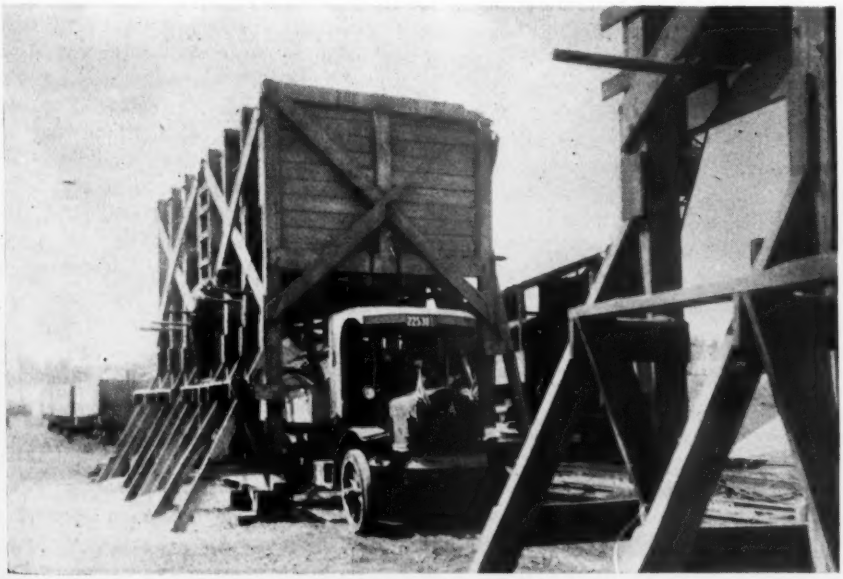


Filling the Bins from the Reserve Piles.

onto the reserve stock piles seen in the background. When time permits the loading is direct to the bins, but when these are filled the reserve is built up to guard against any possible delay in car service.

The sand and gravel comes from the Richardson Sand Co. pits at Carpentersville, Ill., the sand being ¼ inch and under, while the gravel runs from ¼ to ¾ inch.

Several White trucks are used to haul the materials to the tunnels, about a mile away. In loading, the truck does not stop, but is loaded while passing slowly below the chutes. Possibly ten seconds is required to fill the truck.



Loading a Truck as It Passes Under the Bins.

The Bucyrus Shovel Working Along the Face of the 100-Foot Deep Bank of Gravel.

The Fontana Plant of the Wilcox Company.

The recession of the last polar ice cap, which came down from the north some hundred thousands years ago, left in its trail almost enough material to justify one in saying that the "cold spell" had a few blessings in it after all. The most valuable materials left were the piles of sand and gravel, which, practically untouched to this day, mark the stopping places of the several glaciers or stranded icebergs. Northern Illinois and southern Wisconsin are dotted with these sand-piles, which frequently have a depth of a hundred feet, although sixty to eighty is the more usual depth.

There is a variety of materials in every pile, as well as a variation in size. Near the Illinois-Wisconsin line the gravel is rather coarse, so the problem is often how to reduce the mass to merchantable sizes. There is also the requirement of thorough washing as well as screening, so the gravel bank or pit usually means the installation of machinery and equipment for handling, crushing, screening and grading as well as bins for storage of the various grades.

For some kinds of work only one or two sizes may be necessary. Thus for heavy concrete masonry, a 3½-inch screen will take out the boulders, while a ¼-inch screen will remove the sand. The sand, or fine aggregate, may then be mixed in any desired proportions. On the other hand, roofing gravel is generally specified as material passing a ½-inch opening and retained on a ¼-inch opening. The modern plant must be prepared to furnish the sizes required, and this usually means crushing the larger piece of gravel and screening to separate out all coarser or finer than desired grades. The larger the proportion of crushed material, within reasonable limits, the stronger the mortar or concrete.

The same glaciers which brought down the gravel also gouged out the many beautiful lakes which are found in the Illinois-Wisconsin region. Perhaps the queen of lakes is Lake

The Electric Locomotive and Two of the Cars.

Geneva, of great depth, and surrounded by hills of the finest gravel. At the extreme western end of the lake, at Fontana, the Wilcox Company of Chicago, have purchased about 38 acres of gravel beds, and are engaged in preparing the product to meet the requirement of the Chicago market. The illustrations show several interesting features of the plant and indicate the care necessary to prepare a product suited to the Chicago market.

This plant was erected about a year ago, taking the place of a smaller one a short distance away. The design was entrusted to the Smith Engineering Works, Milwaukee. At present the plant is prepared to ship 500 tons a day, the greater part going out on the railroad to the Chicago yards, although the facilities are excellent for delivering by trucks or wagons. Electricity, through General Electric and Westinghouse motors, is used to drive all the machinery and equipment except the Bucyrus shovel used for excavating the gravel and loading it into the cars.

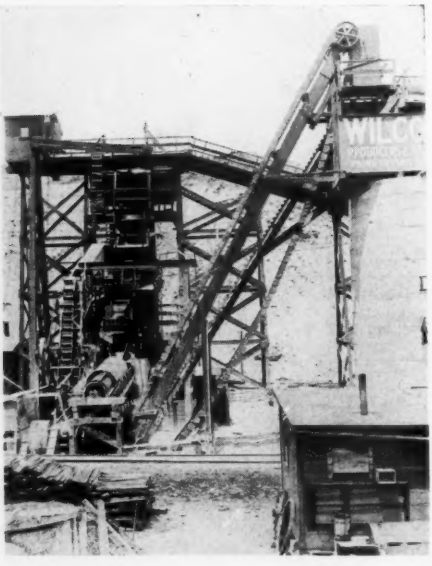
A narrow gauge trolley line runs from the shovel to the switch and thence to the top of the incline. A

The Incline to the Screens and Crushers. Storage Bins on Left.

Goodman electric locomotive handles the Sackett bottom-dump cars to the foot of the incline. At this point a

General View of Plant—Showing Car Loading Chutes.

cable is attached and the cars quickly drawn to the top. Here it is dumped and returns to the switching yard.



General View of Screens, Crusher and Elevator to Storage Bins.

Note the automatic switches which send the loaded cars to the side track and allow the empties to come straight through.

While the Telsmith Breaker will take any stone passing a 10½-inch grid, there are a good many boulders exceeding this size, and these are forming a pile at the rear of the incline. The best of these are used for the field stone walls of the neighboring summer houses. A 1¾-inch grid now separates out the larger stones which go to the breaker which reduces them to 4 inches and under.

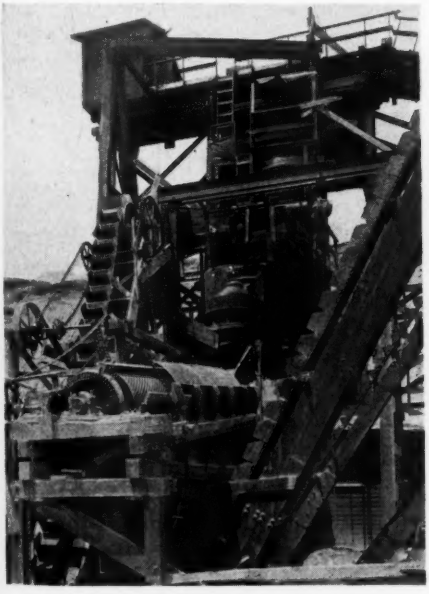
The next course in crushing is by an Austin No. 4 Crusher which will take anything up to 4 inches. The product is again screened and the portion still too large passes through a Symons Crusher which works on material from 1½ inches down.

The finer portions which have passed the screens, are, with the crushed material, carried by a 61 foot bucket elevator to the top of the bins or "silos." Here all the materials are thoroughly washed to remove any dust, clay or loam which may have found its way into the mix, and the mass is graded into five regular sizes, known as Torpedo, Roofing, No. 8, No.

9, and Dust. These five grades find their way into the four circular bins, one bin being divided by a cross partition. These bins are 14 feet in diameter, one being 34 feet high, two 32, and one 28 feet. The bins are arranged to load either cars or wagons, as may be seen from the illustrations.

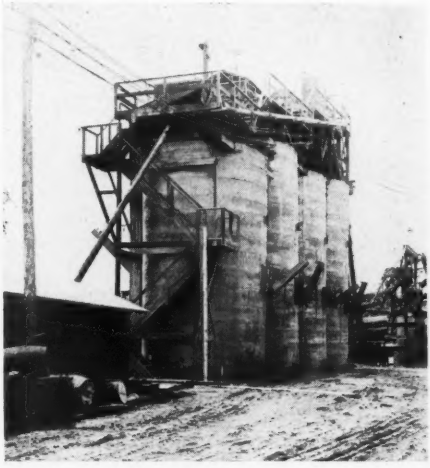
As only a small percentage of the gravel is fine enough for ready use, the crushing machinery is kept busy most of the time. The large proportion of crushed material in the product of this plant accounts for the unusual strength of concrete made with it. The same is true of the torpedo sand. Being largely crushed rock it is sharper than many other sands, and is usually given a preference when strength is required.

A plant of this character would be difficult to operate without a retail yard where the surplus product could be stored, or where relatively small



Screens and Crushers from Foot of Elevator.

orders could be filled. This company has a large retail yard in Chicago, where large quantities of the various sizes are stored, thus keeping the pit working steadily. A portion of the yard is shown in the accompanying illustration, but it is interesting to know that a fleet of 13 large motor trucks, as well as about the same number of horse-drawn wagons, is used to deliver material to the retail customers.



Wagon Delivery Side of Storage Bins. Sand and Gravel Washing and Screening Apparatus Above Bins.

The retail yard is completely equipped with elevators and conveyors, operated by electricity, for handling and storing the materials, for the weight of sand and gravel makes handling expensive except by machinery.

One of the large jobs supplied by the Wilcox Company is the Pennsylvania Railroad Freight House, which will require some 75,000 yards of sand and gravel. The general contractors, the O. W. Rosenthal Co., as well as the sub-contractors will use the materials.

The Fontana plant cannot supply all of this, especially as much of the gravel is coarse, so a pit at Janesville, Wisconsin, owned by the Wilcox Company, furnishes most of the fine sand.

An interesting item is found in the "dust" or extremely fine sand of the make an ideal surface for the roads.

View of the Chicago Delivery Yard—Showing Material Bins, Coal Hopper Building, Loading and Unloading Coal and Material Chute.

Fontana plant. This dust is used as a top dressing by the Geneva Lake Good Roads Association, and they cannot get enough of it. It seems to act like cement with the crushed gravel, to

The Chicago yard of the Wilcox Company is equipped for handling coal the year round, although of course the heaviest work comes in the winter. This aids materially in keeping their organization working at its highest efficiency.

Imperial Belting Company Changes

Mr. Harry E. Dennie, for many years connected with the rubber industries, has been appointed general manager of this company. Mr. Dennie was previously located in Chicago, where he has many friends who will be pleased to learn of his success. Prior to coming to Chicago and for some time back, Mr. Dennie has operated on the Pacific Coast as manager of the company's interests west of Denver. In transferring his headquarters, he returns to his original field of operation and old friends.

Mr. W. S. Bloomer, who has for the past 24 years been connected with one of the largest rubber manufacturers, was also originally a Chicago product, and previously located in Seattle, Wash., as Pacific Northwest manager of this rubber company during the past six years, more recently made special representative throughout the Western States, has been appointed general sales manager of the Imperial Belting Co., with headquarters at the parent office in Chicago.

The addition of both Mr. Dennie and Mr. Bloomer is made necessary by the fast growth of this company, who have made wonderful strides and improvements in the manufacture of canvas belting. These changes were made necessary in order to expand and enable their present efficient force to continue delivering the same high-class service their many satisfied customers have received in the past.

The General Method of Working Pits

(Discussing breasting a bank to work it and excavating from on top.)

Most pits, a decade ago, were worked by hand, and the ordinary method was to excavate them with a breast, caving the bank in from some height, so that men could pick up the material with shovels. To some extent when hand methods are used this is still prevalent.

There has been placed on the market a large variety of excavating machinery for pit work, during the past ten years, and inasmuch as much of this, as power scrapers and slack cable ways, do not work against a breast, but work the bit from on top, the methods have changed, and today we have two general methods of excavating material from pits.

One is excavating from on top. The second is against a breast. There cannot be a hard and fast rule laid down for using either method. Each must depend upon the local conditions, and the extent of the operation.

For hand work the original method of breasting the bank is the proper one, for the excavation is more expensive to make from on top, even if it is sand and needs no loosening. Yet some pitmen work from on top just as though they had excavating machinery of that type. Only recently the writer visited a new pit being worked by hand and found this method being used.

When machinery is installed and the operation is a limited one, unless the situation of the pit is unusual, the method of working from on top is the logical one. It may not necessarily mean the cheapest installation of a plant, but under many circumstances a very cheap plant for a considerable output can be installed. There have been several such described in Pit & Quarry during the past year.

Slack cableways and power scrapers must work in this manner as well as grab buckets. It can be seen at once that one half of the time of any of these machines is taken up in returning the empty to the pit.

For excavating under water, the slack cableway is the easiest and cheapest, unless it is necessary to use a dredge. Many of the devices used for excavating from on top also transport the material to the screens or loading bins. This is an advantage in some cases, yet it means a limited output.

However, if the excavated material must be elevated to a considerable height then this is the method to use for in one operation the excavating, the elevating and transporting can be done.

If large quantities must be obtained from a pit then some type of machine should be installed that will excavate against a breast, such as a steam shovel. With the proper installation of trains, wagons, trucks or even a belt conveyor the excavating machine can be kept going almost continuously and a large tonnage can be handled. A steam shovel is not the only machine that will excavate material by this method. Great heights of banks can be excavated in this manner as it will cost but little to keep the material close to the excavator.

Cars are easily loaded and operated down a grade by this method, as power need only be used to get the empty cars back to the pit.

In operating against a breast it is also possible to install more than one excavating unit, yet not duplicate the handling and loading plant.

The decision as to which of these two methods should be used for any particular pit is one that must be made with great deliberation, considering the lay of the pit, the location of the screening and washing plant, the

situation of the storage and loading bins, and other conditions mentioned.

Only too frequently owners allow salesmen to influence them in order to sell a certain type of plant. This means that the owner has not studied his own pit, nor has he investigated the various types of machines on the market. Thus he may install a plant only to regret his decision.

About a year ago the treasurer of a sand and gravel company told the writer that he had expended about $20,000 on a plant that worked their pit by one of these methods and all the officers and directors had come to a realization of the fact that the other method should have been employed. This is not the only pitman who had made similar statements to the writer during the past two or three years.

Pit & Quarry through its articles and advertisements will assist pitmen to solve their problems of both methods of working and selection of plant.

METHODS OF OPERATING LIMESTONE QUARRIES IN PENNSYLVANIA.

(Descriptive of methods employed by D. J. Hauer, with critical comments and suggestions how to save money in quarrying the rock.)

Quarry operations can and should vary exceedingly. In fact the operations in many quarries should vary somewhat during a course of years, due to new tools and machinery being placed on the market, and to the fact that as many quarries are developed, improved methods can be intrdouced. The writer has been visiting and assisting in developing and improving quarries for nearly fifteen years, and it is surprising how many quarries are being operated by the same methods, one decade after another.

The quarries to be described are operated by the J. R. Bittenger Co., at Bittenger Station, near Hanover, in York county, Pennsylvania. Ten years ago the writer visited the main quarry and it was then being operated by the same general methods as are used today.

Although the quarry is located in a rolling rocky county, the ledge does not appear above the ground. The rock, a very good grade of whitish blue limestone, has from five to ten feet of clay overburden, so that the quarry has been developed as a hole from seventy to seventy-five feet deep, and must now cover nearly an acre of land.

The lime rock is used to burn for lime and for crushed stone. Naturally all the product must be hauled up inclines. These were located some years ago when the area covered by the quarry was small, with the result that these inclines are very steep, being at an angle of about 45 degrees. In all there are three inclines, two for the lime kilns and one for the stone crushers. These are built of legs or bents of wood timbers and stringers of sawed timbers. These trestles are cheaply built, and are easily pulled down and rebuilt, and it would seem the part of wisdom to have rebuilt these trestles some years ago, for the inclines would not have been so steep and the hoisting engines would have operated the cars for a greater distance in the quarry, saving time and money in handling them by either horses or men.

The incline track that carries stone to the five lime kilns, stops at the foot of the incline, where there is a platfrom or wharf built up a little higher than the side of the car. One horse dump carts are loaded at the breast of the ledge and taken to the wharf

and dumped into the car. On this incline only the one car is used. It can be seen that if this incline had been rebuilt and the track extended to several parts against the breast of the quarry, that carts, always an expensize method of hauling, could be eliminated, and at least one of the horses saved. Then, too, if need be, more stone could be handled up the incline.

The cars used are a low all-steel quarry car with high sides, dumping from a tipple. These cars are manufactured by the Watt Mining Car Co., and the Fairbanks Co. They are illustrated in Fig. 2.

Fig. 1. The Ledge of the Quarry and Incline to Lime Kiln.

For the flame kilns and the crushers these cars are loaded at the breast of the ledge and pulled to the inclines, then hoisted by the hoisting engines and dumped into the kilns or crushers from the tipples. The fact that the inclines are only single track, limits the amount of stone handled over them. This is not so important for the kilns, but it limits the output of the crushers. This incline should be a double track one, then a loaded car could go up as an empty one is being returned to the pit. This is frequently the arrangements of tracks in quarries similar to this and counts not only for a greater output, but a lower cost per ton produced.

There are really two quarries being worked, the large one shown in Fig. 1, and a smaller one, called No. 2, being developed. Here there is only a crusher and the ledge being drilled and blasted is only about ten feet. The arrangement of the tracks in this quarry admits of the most economical loading, see Fig. 2. These cars must run with the open end up the incline so as to dump on the tipple. In quarry No. 2, the cars run down the incline to a dead end track, as shown on the right in Fig. 2, when they are shifted by hand onto the quarry track, shown on the left.

This brings the open end of the car against the breast of the ledge so that the men load the car in that end saving lifting the majority of the stone to any height, reducing the cost of the loading. In quarry No. 1, the tracks

are all straight away from the incline, except the one shown in Fig. 1, where the cars are loaded from the wharf or rampart by carts. The arrangement in this quarry brings all the cars with the closed ends against the breast of the ledge, so that in loading all the stone must be lifted over the ends and the sides.. For a car or two this may not count much, but the extra cost of men raising thousands of tons in a

Fig. 2. Type of Car Used.

year over these sides, runs into a large sum of money. The least amount of work that a man can do in foot pounds is in raising loads vertically.

To overcome this trouble in quarry No. 1, several small turntables could be installed on the quarry floor, so that the cars could be turned both when empty and loaded and the money saved in loading would more than pay for the plant charge on the turntables and the cost of turning the cars, thus netting the quarryman an extra profit.

The stripping in both quarries is done by hand. Men load dump wagons, one team being used for two wagons, thus the empty is being loaded while one wagon goes to the dump. With the present price of wages for men and teams the cost of such stuffing will run from forty to sixty cents for each cubic yard of earth excavated. This is not high when the cost is distributed over the tonnage of rock moved in quarry No. 1, with the stuffing seldom running deeper than twelve feet, and the work being done at odd times when the men are not otherwise employed, nevertheless money could be saved over this hand work, for there are several methods of doing the work cheaper.

One would be the use of four-wheeled scrapers, which could, in all probabilities, reduce the cost to less than 25 cents per cubic yard. A small power scraper could also be used, and likewise a steam excavator of the Keystone type or a small steam shovel. Work could also be found for these things at road building and other contract work that the quarryman also does.

In quarry No. 2, as will be seen from Fig. 3, the stuffing is too heavy for the depth of the ledge being worked. The excuse for this is that this quarry is a new development, but as it is being worked continuously the quarry floor should be lowered so as to give a depth to the ledge of from 15 to 20 feet so as to make the cost of quarrying per ton, for development and all the work, less per ton of stone produced.

Fig. 3 also shows the result of a blast in quarry No. 2. The methods of drilling and blasting in both quarries is quite similar. Ingersoll-Rand steam drills are used to drill series of holes, that are exploded at one time. The holes are drilled from 10 to 20 feet in depth and exploded with 40 per cent ammonia dynamite furnished by

Atlas, Aetna and Du Pont companies. The charges used are generally ample to throw down a large tonnage of stone as shown in Fig. 3, but in other cases the ledge is simply shattered and broken as is shown in Fig. 1, where if a close examination is made of the photograph it will be seen that down most of the entire mass, but it had to be blocked and sledged and there were many delays. The cost, this was some years ago, when labor and supplies were cheaper, was about 42 cents per cu. yd. One pound of explosives was used for each cubic yard of rock, the blasting cost being

Fig. 3. Blast at Low Lift of Quarry No. 2.

the top of the ledge for 15 or 20 feet has been shattered and broken up, but it still has to be thrown to the quarry floor.

Some quarrymen consider such a blast a failure, but it is questionable if it is, for a blast of this kind frequently gives better and more economical results than those that scatter the rock over the quarry floor in large masses, doing damage to tracks and inclines and causing long delays in operating the plant. The test of any blast is in the cost of loosening the rock and picking it up. The writer has not any exact data on blasts in this quarry, but has it in other quarries. In another quarry he made two blasts, loosening in each about 500 cu. yds. of rock. The first one threw nearly 20 cents per cubic yard. In the sescond blast the breast of the ledge was cracked and broken, but only a few yards of rock was thrown to the quarry floor. It was necessary to use extra dynamite to throw down the breast, then hundreds of yards was found to be pulverized and broken up for easy handling. The cost of blasting per yard was less than 14 cents, while the extra cost of loosening and loading was only 31 cents. Nearly two cubic yards of rock were loosened with each point of powder used. The difference in cost was due to the wasting of powder and the extra work of drilling and breaking. This is a subject that the writer hopes to treat in other articles, namely the drilling and blasting of rock in quarries.

In these two quarries five steam drills are used. For breaking up boulders and for toe holes jack hammer drills are used, there being four drills of this type for such use.

For this quarry well drillers would prove economical, but if such machines were installed the writer would not approve of doing away with the other drills, their use would simply be curtailed. Many quarrymen do a wise thing in using well drillers, but they make a mistake in doing away with their steam or air drills. This subject, too, will be treated in other articles.

One of the most economical drills that a quarryman can install for short holes and blocking boulders is the type of air and steam drills, represented by the jack hammer type. One man with such a drill will do the work of several tripod drills and also of three or four gangs of hand drillers.

One serious and expensive item in pit quarries is the pumping of water. A hole is generally blasted out deeper than the quarry floor, which acts as a sump for the collection of the water. Pumps must be installed and in many quarries must be operated night and day. This item of pumping is an expensive one in these quarries. In the small pit a Worthington pump is installed, while in the old quarry there are two larger pumps, one being a Worthington and the other a Blake. These two pumps have six-inch suction and four-inch discharge. The only salvage from this cost of pumping is the fact that water is thus furnished for the boilers.

Fig. 4. The Crusher Plant at Quarry No. 1.

The plant at the No. 2 quarry consists of a boiler manufactured by the Harrisburg Foundry Co., of Harrisburg, Pa., a double cylinder, single drum hoisting engine to pull the cars from the quarry, a 10x14 Climax jaw crusher, and an A. B. Farquahar Co. of York, Pa., engine for operating the crusher. In this quarry only crushed stone is produced, it being shipped by cars or trucks.

The crusher plant at No. 1 quarry is shown in Fig. 3. Here there are a battery of four boilers, two made by the Pennsylvania Boiler Works of Erie, Pa., and two by Bromwell & Schmidt of York, Pa. These boilers furnish steam for the drilling, pumping, the hoists for the inclines, which are Flory machines, and two Nagle

engines that operate the crushers, elevators and screens.

The crushers consist of two No. 5 Champion crushers and a New Holland for breaking up the tailings from the screens.

There are two sets of lime kilns, four old style fire kilns built of masonry, shown in Fig. 1, and four flame kilns built of steel, located near the crushers. Near the office is located a set of Howe scales, for weighing wagons and trucks.

Although much of the product, both of lime and crushed stone is shipped by rail in carload lots, yet a large local business is carried on. This is done by means of auto-trucks. For this purpose three trucks from three to five ton capacity are used. They are Mack and Denby trucks. At times other trucks are hired. A garage at the quarry houses these cars.

There is also a blacksmith shop included in the equipment to sharpen steel tools and do repair work.

It is contemplated to install an air compressor in the near future. These are quarries at which money is being made, but some economies could be effected so as to make it a better paying proposition. This limestone analyzes well for land purposes, so that the dust could be ground for agricultural purposes, and a ready sale no doubt found for it, as the quarry is located in a rich agricultural country and the farmers are accustomed to using lime on their land. This product could be sold by itself and also mixed with lime to be used on land.

The business has grown to such proportions that the plant needs to be rebuilt, so as to bring it up to date and give a larger output, and at the same time reduce the costs.

Sand and Gravel.*

By R. W. Stone.

ROAD MATERIAL.

Military preparedness includes in time of peace the construction of permanent trunk highways and in time of war the hasty improvement of roads that lead from military bases to the line of action. Improvement of roads under war conditions would in most places mean surfacing with a mixture of sand and clay or of sand, clay and gravel. This material is abundant; in fact, there are few areas in the United States where a good supply can not be had within a reasonable distance. The United States Geological Survey is in touch with thousands of producers of sand and gravel, and many of its detailed geologic maps show the distribution of the deposits.

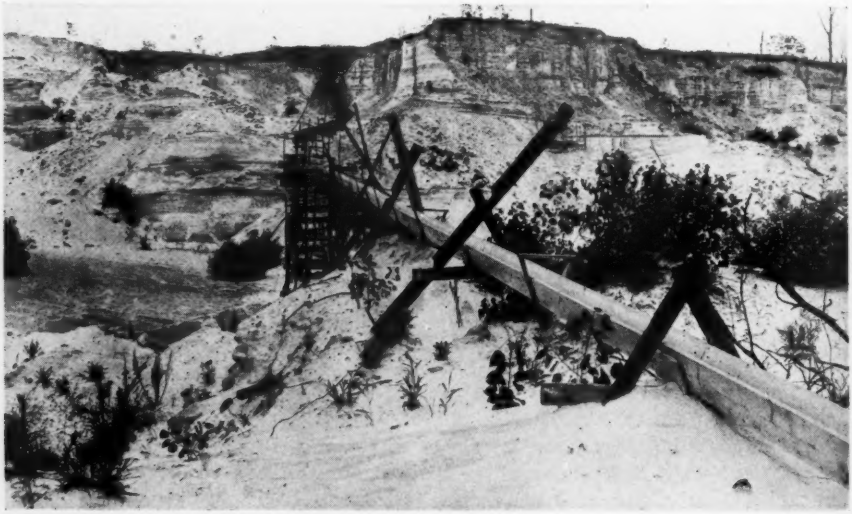
GLASS SAND.

The glass-making industry is in no way dependent on foreign supplies for its sand, salt cake, soda ash, and limestone. Our resources in these materials are ample. Most of the output of glass sand comes from a belt of states extending from New Jersey to Missouri. Illinois, Pennsylvania, and West Virginia are the largest producers, and Illinois leads, producing well over 500,000 tons, largely by disintegration of the friable St. Peter sandstone. California is the only state west of Oklahoma that produced glass sand in 1915.

Glass sand has formerly been brought to this country in ballast from European ports, but the present conflict cut off this small importation. The war, by unsettling general business conditions, for a number of months put a damper on the glass industry in this country. Later, however, business has increased, building operations are active, demanding large quantities of window glass, and furthermore glassware is now being exported in quantity to Europe and to the countries which the European glass industry formerly supplied. Consequently the glass industry is

*From U. S. Geological Survey Bulletin 666-G.

booming, and as a corollary the production of glass sand has increased. The output in 1917 approximated 2,000,000 tons and was thus larger than it has ever been. On account of the higher wages and the increased cost of machinery and of all supplies, particularly coal, the price of glass sand, which has been decreasing in the last few years, showed an upward tendency in 1916.



E. T. Reynolds & Co. Sand Pit near Utica, Ill. The Sand is Washed Down Through the Flume to the Building Shown on Page 33. The Sand Is Firm When First Exposed but Soon Falls into a Loose Powder.

The glass sand deposits in this country are very extensive and are found in many states. Many deposits of high-grade material are undeveloped. Quartz sand suitable for making cheap glass occurs in great quantity in the white dunes on the coast of California and along the shores of the Gulf of Mexico and in the white quartzite and sandstone in many parts of the country. Most of the glass factories in this country are located with relation to large supplies of the cheap fuel--natural gas—so that West Virginia, Pennsylvania, and the Ohio Valley contain most of them.

MOULDING SAND

The new requirements of armament and munitions have caused foundries and machine shops to increase their output, and this activity is in turn reflected in the molding-sand industry. The total production in 1915 was 3,500,000 tons, more than two-thirds of which came from New Jersey, New York, Pennsylvania, and Ohio. This was 750,000 tons more than the output of 1914. The statistics for 1916 are not yet available (April, 1917), but it is confidently expected that they will show 4,500,000 tons produced in that year. This country has unknown quantities of molding sand of different kinds, such as that required for light and heavy iron and steel castings. The developed deposits are very largely in the eastern states, because that is where most of the foundries are situated. As freight rates practically prohibit long-distance shipping of this heavy and cheap commodity, little search has been made for deposits in the western states, where the demand for molding sand is small.

Up to 1914 molding sand was annually imported from France for use in casting bronze. The French sand is used for facing the molds, and as most of the casting done in it is art work, the curtailment would not seem to be serious in a time of national stress. In response to requests from importers of the French sand and from bronze molders the United States Geological Survey has sought for a domestic substitute and is now able to announce that sands which on preliminary tests prove to be satisfactory substitutes for the French molding sand have been found near Albany, N. Y., and Zanesville, Ohio. Bronze and brass castings made at government arsenals and navy yards for many years have been poured in sand from the Albany district; commercial foundries and manufacturers use sand from Albany, N. Y., Windsor Locks, Conn., and several localities in Ohio for facing molds for brass and bronze castings that do not require the extremely fine finish of art work. The supply at these places is abundant, and the country seems able to meet any requirement in quality and quantity of molding sand.

ABRASIVE SAND

Sand suitable for grinding and polishing, ranging from small gravel for use in sand-blast work on heavy castings to the fine material used for giving a polish, is abundant, and the country produces about 1,000,000 tons annually. Pennsylvania is the leading producer and in some years furnishes one-half of the output. The present activity in the production of armament will call for an increased production of this material, for it is the practice in large foundries to clean castings by sand-blast.

This Building contains Screens, Washers and Driers. Chutes from the Bins Load the Dried Sand into the Cars. Most of this Sand Is Used for Glass Making.

GENERAL CONDITIONS

The sand industry in all its branches grows normally with increase of population. Severe business depression decreases the production of building sand more than that of sand for some other uses, such as engine sand, which is used wherever trains and trolley cars run.

Universal Crushed Stone Co.
PURCHASE STONE

Bill to ..... F.O.B. .....

Address .....

Chicago, ... 19..... No. 841

Shipped by ..... Checked by .....

From ..... Extended by .....

(Our Order No. .....

To ..... Via .....

At .....

	INITIAL	CAR NO.	KIND	TRT.	WEIGHT		TONS	CU. YDS.	PRICE	AMOUNT	
	RATE			FRT. RESERVE $							

Fig. 1. The Quarry Record of Shipments.

KEEPING TRACK OF DELIVERIES.

How the Producers Material Co. Handle Their Large Business in Sand, Gravel and Crushed Stone.

A good many cost and record systems are extremely accurate, and yet by their complication they defeat the very purpose of bookkeeping. Unless his part of the system can be understood by the teamster making the delivery, errors will occur which will defeat the very purpose of the system.

The sand and stone business is a specialized one, there being practically only one material, although in half a dozen grades. Coming from only one or two sources, that part is simplified also. But in the delivery there is opportunity for errors. Dump a load of sand on a pile and no human power can separate it out. Empty a car of crushed stone in a bin and who can determine how much went in. This fact in connection with the business

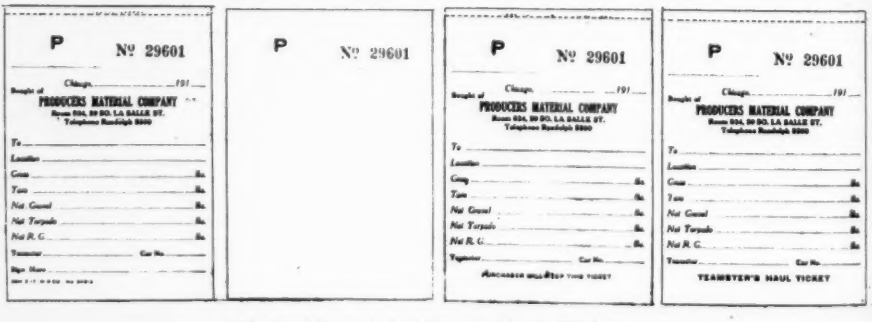


Fig. 2-3-4 and 5. The Book of Tickets.

makes it necessary to be accurate all the way through, and to follow a simple system practically proof against mistakes.

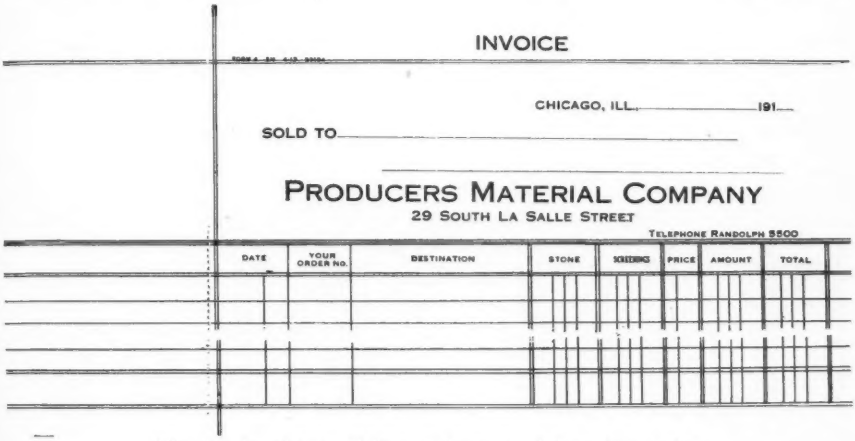
Through the courtesy of the Producers Material Co. we are showing the forms they use in their shipments. The greater part of their material comes from one quarry controlled by them, so Form No. 1 is practically an office memorandum giving the particulars of shipments. The same form covers the shipments made direct to outside concerns. This form is about 5x7 inches and gives ample space for all the data required.

Forms Nos. 2, 3, 4 and 5 are about 3x4½ inches and put up in book form, No. 2 being on top to receive the signature of the customer and to be returned to the office. No. 3 is a thin tissue, the impression being received on the back by a double face carbon sheet, the other side of the carbon being on No. 4. The customer keeps No. 4 for his records. No. 5 is a check sheet to be retained by the teamster. In case the hauling is done by a separate teaming contractor this serves as his record.

Form No. 6 is made up in the office from Form No. 2 or the signed tickets No. 3, turned in by the teamster. The edge of this sheet is perforated to permit the forms being kept in book form with No. 7, which is a carbon copy of No. 6.

Carload shipments are taken care of on Forms Nos. 8 and 9, the former having a perforated edge to permit tearing out, and the latter having an extension for the purpose of entering payments, etc.

These forms have proven very satisfactory for a large volume of business, it being easy to trace any shipment and check up any claim of error. Practically all the work is done in the


INVOICE

CHICAGO, ILL. 191

SOLD TO

PRODUCERS MATERIAL COMPANY
29 SOUTH LA SALLE STREET
TELEPHONE RANDOLPH 5500

DATE	YOUR ORDER No.	DESTINATION	STONE	[illegible]	PRICE	AMOUNT	TOTAL

Fig. 6. Invoice to Follow Shipment of Complete Order.

CHICAGO, ILL. 191

SOLD TO

PRODUCERS MATERIAL COMPANY
29 SOUTH LA SALLE STREET
TELEPHONE RANDOLPH 5500

DATE	YOUR ORDER No.	DESTINATION	STONE	[illegible]	PRICE	AMOUNT	TOTAL	YARD

Fig. 7. Carbon Copy of Invoice.

We Are the Pioneer Manufacturers of Gravel Washing Machinery

The first gravel washing plant was an "S-A" Plant. We developed the original gravel washing machinery which is still recognized as standard. In fact, the records will show that we actually developed the industry.

Altogether in the past fourteen years we have designed and equipped about 400 gravel washing plants. Each one of these was especially designed—each one has been a *commercial success*. We have turned down orders for a number of plants where the elements of success where lacking. We have turned failure into success for several others by re-equipping with "S-A" Machinery.

We have a strong organization of engineers—and a large plant devoted to the manufacture of the highest grade of conveying elevating, screening and transmission machinery.

It is to your interest to deal with manufacturers and not jobbers

"Ask the Man Who Owns One"

The following is an incomplete list of the newer "S-A" plants

Gravel Washing

Los Angeles Rock & Gravel Co.
Scottsville Sand & Gravel Co.
Montana Concrete Co.
Vandalia Railroad.
Standard Builders' Supply Co.
Hawarden Sand & Gravel Co.
H. D. Conkey Sand & Gravel Co.
F. A. Downs Construction Co.
Mason City Sand & Gravel Co.
Jensen & Jensen.
Virginia Sand & Gravel Co.
L. D. Burd.
Wabee Gravel Co.
Summit Sand & Gravel Co.
Geo. J. Hoffman.
Logansport Gravel Co.
Battjes Fuel & Supply Co.
Wabash Sand & Gravel Co.
Macksville Gravel Co.
Mason City Sand & Gravel Co.
Covington Sand & Gravel Co.
American Agricultural Chemical Co.
Madison Construction Co.
Windsor Sand & Gravel Co.
Atwood Davis Sand Co.
Lake County Gravel Co.
Chas. Vivian.
Vigo Washed Sand & Gravel Co.
Interstate Material Co.
H. W. Hawly.
Wabash Sand & Gravel Co.
Kingsley & Pagant.
Pueblo Bridge.
Minden Gravel Co.
C. H. Billings.
Canada Sand & Gravel Co.
C. H. Little & Co.
Beaver Sand Co.
McCraney Sand Co.
Coon River Sand Co.
Downs Construction Co.
Virginia Sand & Gravel Co.
Chicago Gravel Co.
Hoyt Mining Co.

Stone Washing

Brownell Improvement Co.
Peoples Crushed Stone Co.
U. S. Crushed Stone Co.
Big Rock Stone & Const. Co.

"S-A" Equipped Crushing Plants

A. C. Laughlin Stone Co.
France Stone Co.
General Crushed Stone Co.
National Lime & Stone Co.
Bessemer Limestone Co.
Branchton Limestone Co.
Blair Limestone Co.
Standard Lime & Stone Co.
Union Lime Co.
Elmhurst & Chicago Stone Co.
Leathem & Smith.
Greenleaf Stone Co.

We'll gladly supply the address of any of the above for reference or send names of "S-A" plants in your territory

Put your proposition up to us and we'll help you make it pay

Stephens-Adamson Mfg. Co.

Aurora, Ill.

main office, the quarry or pit having only to send in their daily record of shipments, and the teamster to see that he gets his tickets signed. A good many firms insist that the tickets be signed before the load is dumped, and this is the safest way.

These forms might have to be varied for places where the material is handled in a different manner, but they will serve as a good example, from which one may make up froms suitable to any particular locality.

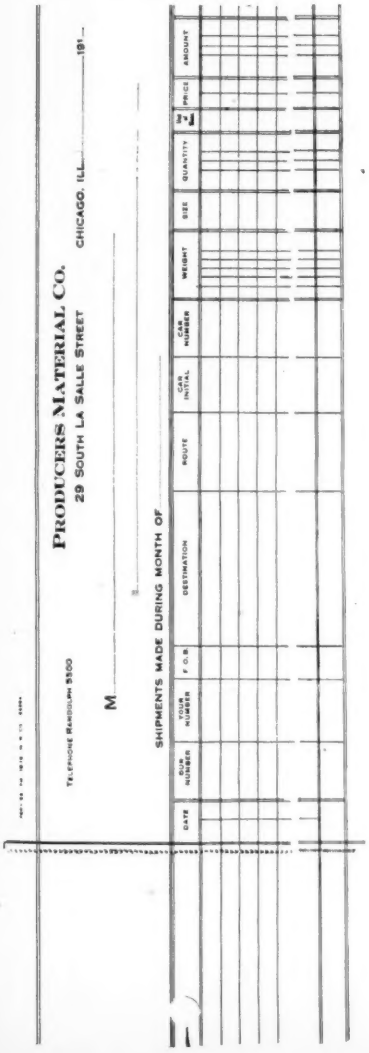

PRODUCERS MATERIAL CO.
29 SOUTH LA SALLE STREET
CHICAGO, ILL. ——— 191—
M ———
SHIPMENTS MADE DURING MONTH OF ———
DATE | OUR NUMBER | YOUR NUMBER | F. O. B. | DESTINATION | ROUTE | CAR INITIAL | CAR NUMBER | WEIGHT | SIZE | QUANTITY | PRICE | AMOUNT

Fig. 8. The Monthly Statement.

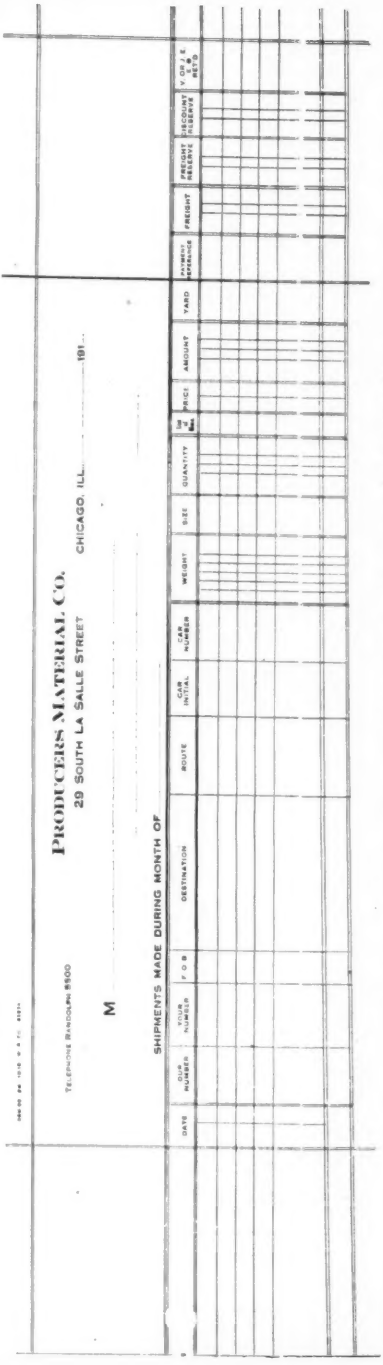
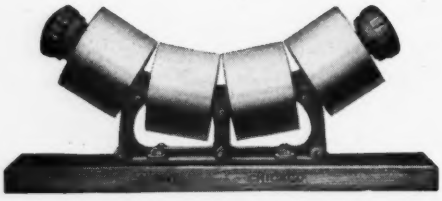

PRODUCERS MATERIAL CO.
29 SOUTH LA SALLE STREET
CHICAGO, ILL. ——— 191—
M ———
SHIPMENTS MADE DURING MONTH OF ———
DATE | OUR NUMBER | YOUR NUMBER | F. O. B. | DESTINATION | ROUTE | CAR INITIAL | CAR NUMBER | WEIGHT | SIZE | QUANTITY | PRICE | AMOUNT | YARD | FREIGHT | FREIGHT RESERVE | DISCOUNT RESERVE

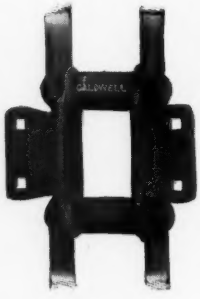
Fig. 9. Carbon of Monthly Statement, with Space for Extensions.

CALDWELL MACHINERY

FOR HANDLING

Stone, Gravel, Sand





Screw and Belt Conveyors, Steel Elevator Casings and Buckets, Gears, Cut and Cast Teeth, Link Chain Belting, Shafting, Pulleys, Sprocket Wheels, Etc.

H. W. CALDWELL & SON CO.

CHICAGO

Western Ave., 17th to 18th Sts.

REDUCING THE COST OF LOADING MOTOR TRUCKS AND WAGONS

The constantly increasing labor shortage and the consequent rise in wages is forcing sand and gravel dealers, contractors, building supply dealers and others to adopt some mechanical means to reduce the cost of loading sand, gravel, crushed stone, ashes, coal and other materials from ground storage.

The high cost of hand-shoveling material with wagons and trucks can be replaced by labor-saving machinery. Profits are going to waste if more than one man is used for this purpose. Tests have proven that one man can hand-shovel a yard of sand, gravel or crushed stone in 20 minutes. To load a five-ton truck at the same rate it would take 5 men 20 minutes. The Jeffrey Self-Propelling Loader and one man will load the same capacity in four to six minutes. The saving in time and labor will amount to a large item in a year's time, especially now when wages are higher than ever before.

The Jeffrey Loader eliminates the drudgery incident to hand-shoveling and the confusion resulting where a large force of laborers are employed. It is difficult at the present time to employ men to load heavy materials into wagons or trucks for ten hours a day. The Jeffrey Loader will work continuously for 24 hours a day if necessary, loading at the rate of 1 to 1½ yards of sand, gravel or crushed stone per minute.

Fig. 1. Loading a 7-ton Truck with Fine Sand in 6 to 8 Minutes.

The Jeffrey Loader enables the motor trucks or teams to make many more trips daily, as they are not kept waiting for loads.

The self-propelling device enables one man to operate the loader. He can advance the machine under its own power into the pile, then back it up and move to some more advantageous position in the same pile or to a distant pile. Without the self-propelling device it would require 3 or 4 men to push the machine about. The elevator can be collapsed so that

"BLAW" Steel Forms for Concrete Construction "BLAW" Clamshell Buckets
Steel Mill Buildings and Manufacturing Plants
Transmission Towers

WE TAKE PLEASURE IN ANNOUNCING

THE CONSOLIDATION OF THE

BLAW STEEL CONSTRUCTION COMPANY

AND THE

KNOX PRESSED AND WELDED STEEL CO.

EFFECTIVE JULY 1, 1917

UNDER THE NAME OF THE

BLAW-KNOX COMPANY

EXECUTIVE OFFICES
HOBOKEN, PA.

GENERAL SALES OFFICES
PITTSBURGH, PA.

BRANCH OFFICES

BOSTON CHICAGO NEW YORK SAN FRANCISCO
SHEFFIELD, ENGLAND

WORKS

HOBOKEN, PA. WHEATLAND, PA.

THE MERGER OF THE TWO COMPANIES WILL PERMIT OF INCREASED FACILITIES AND AN EVEN HIGHER STANDARD OF SERVICE TO THE CUSTOMERS OF THE ORIGINAL COMPANIES.

THE PERSONNEL OF THE TWO ORGANIZATIONS WILL REMAIN UNCHANGED.

"KNOX" Patented Oven Hearth Doors, Door Frames Ports and Reversing Valves
Pressed and Welded Steel Specialties
Steel Plate Construction

it is parallel with the horizontal, this feature enabling the loader to be moved over the ground more readily and to pass under low sheds, trestles, bridges and other overhead obstructions.

pelling Loader in operation at the plant of the Southern Sand, Gravel and Supply Co., of Columbus, Ohio, loading a 7-ton truck with fine sand and in 6 to 8 minutes. The same machine also handles gravel at this plant and in one afternoon it loaded 187 two-yard wagons. The saving effected over hand-shoveling, formerly employed, paid for the machine in two months.

Figure 2 shows the Jeffrey Self-Propelling Loaded handling broken stone at the yards of the Engineering Supply and Erection Co., Hudson St., Jersey City, N. J. Large quantities of sand and broken stone are delivered by barges and then handled by dredge buckets and stored in piles on the surface of the ground. One man operates this loader and loads the 5-ton truck shown in the illustration in 4 to 6 minutes.

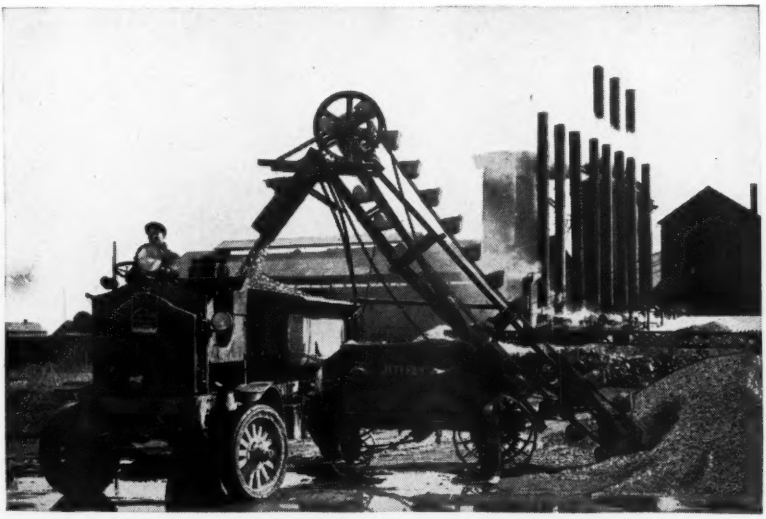


Fig. 2. One Man Loads this 5-ton Truck in 4 to 6 Minutes.

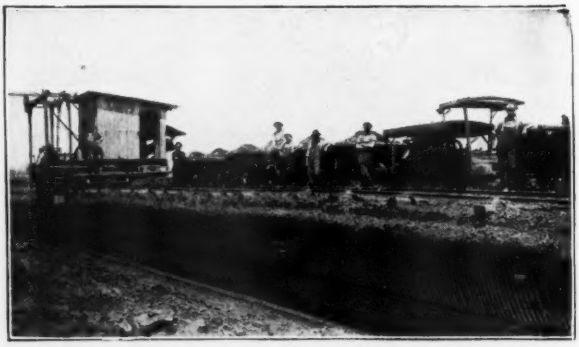
Full particulars regarding Jeffrey Self-Propelling Wagons and Truck Loaders may be obtained by addressing the Jeffrey Manufacturing Co., 990 North Fourth Street, Columbus, Ohio.

Erie Steam Shovels.

An unlimited source of supply is one of the requisites of a money making sand or gravel plant. The equipment used is just as important, as it is possible to lose through breakdowns, delays and inefficient outfit more than can be compensated by other conditions.

The Ball Engine Company, Erie, Pa., manufacturers of the Erie Steam Shovel, believe they make the one best machine for sand and gravel pits. The design is such that a large yardage may be taken out without moving the shovel, the long, deep and high reach contributing to the effective work.

The Erie Steam Shovel was designed to meet the conditions found in the ordinary pit. It will dig some three feet below the bottom of the wheels,



The Plymouth Hauling Clay for the Claycraft Brick Co.

"Cheaper in Clay Pit Than Horses" —*Says M. J. Kaufman*

It costs the Claycraft Brick Co., of Columbus, O., less than half to haul clay with a Plymouth-drive Gasoline Locomotive than with horses, besides adding six more cars and keeping the digger and pit men busy.

The Plymouth
Friction-Drive Gasoline Locomotive
Cuts Haulage Costs One Half

The Friction-drive, Continental Motor, Hyatt Bearings, and Heavy Frame—simplest and best of construction, is The Plymouth's secret. No expensive gears—lubrication eliminated—repairs nil. A day-laborer and 5 gallons gasoline run it 10 hours. It takes higher grades, outpulls all locomotives and costs half or one-third less to buy.

Kaufman Proves This:

"Six horses cost us $2.25 daily to feed, and three drivers $1 a day each, making $5.25 daily," says M. J. Kaufman of the Claycraft Brick Co. "The Plymouth costs us 67c for gasoline, 5c for oil and $1.50 for the operator. Our saving of 20 cents per thousand brick paid for the locomotive and cars in one short season."

Book Tells: It describes this and other installations; and gives cost data regarding haulage problems similar to your own. Send for it.

THE J. D. FATE CO.

206 Riggs Ave., PLYMOUTH, O.

and raise the bucket so as to fill a car or wagon standing on an eight or ten foot bank. In every way it is adapted to everyday use, and our readers should have Bulletin S-16, describing the shovel in detail. This bulletin will be sent free on request to the Ball Engine Co.

Making Agricultural Limestone

One of the features of our agricultural schools is an appreciation of the value of pulverized limestone for many farms. Not all land needs it, but so many do that the manufacture and sale of machinery to produce the limestone is quite a business in itself.

The Bradley Pulverizer Co., Allentown, Pa., in catalog No. 42, describe the several mills which will produce pulverized limestone. Those interested in this industry should write for it.

New Publications.

Technical Paper No. 165, giving particulars of quarry accidents for the year 1915, can be obtained from the Director of the Bureau of Mines, Washington, D. C.

Sandstone Quarrying in the U. S., by Oliver Bowles, 143 pp., 16 plates, 19 figures. Bulletin 124, prepared by the Bureau of Mines, is a most valuable treatise on Sandstone Quarrying. It shows the best methods of taking out this useful stone, as well as a great number of important facts connected with its use. Those particularly interested in the subject may obtain copies free on application to the Director of the Bureau of Mines, Washington, D. C.

FOR SALE

Bucyrus class 14 dragline.
Lidgerwood dragline, 60 ft. boom.
Marion, Model 75 Steam Shovel, 2½ yd. dipper.
No. 1 Thew Shovel, 1 yd. dipper.
Gates 7½, 6 and 5 crushers.
Blake 13x21 jaw crusher.
Blaw 18x30 jaw crusher.
20—12 yd. dump cars.
30— 4 " " "
20—1½ " " "
2—10x16 Vulcan dinkeys, 36 in. gauge.

DONAHUE & CO.
20 W. Jackson St. CHICAGO, ILL.

FOR SALE

One 40" x 16' Austin screen with or without sections. One 100 H. P. boiler. Both are in good condition. We are replacing with larger equipment.

WORLOCK STONE CO., Canastota, N. Y.

FOR SALE

35 acres sand and gravel in city of Cedar Rapids, located on the C. R. I. & P. R. R. Splendid proposition for sand, gravel and sponsible firm. Address T. A. Kelty, owner, Cedar Rapids, Iowa.

FOR SALE

Second-hand crushers: Austin No. 5 and Austin No. 3. Can be placed and put into service without expense other than cost of erection. Address: Hummelstown Brown-Stone Co., Waltonville, Pa.

WANTED

Superintendent; must have initiative and executive ability, understand handling men, proper operation of crushing and quarrying machihery. Apply to The Spalding Quarry Co., Atchison, Kansas.

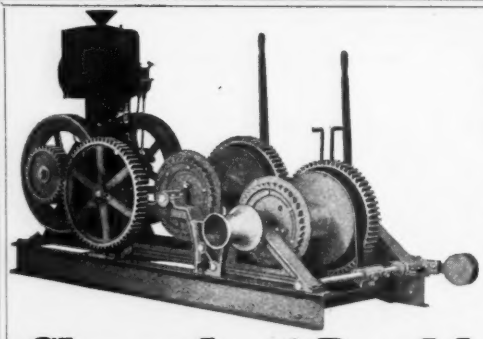
J. A. RIDGWAY
Woolworth Bldg
NEW YORK

Telephone:
Barclay 6398

New York Sales Agent for the

"Plymouth" Gasoline Industrial Locomotive

MADE BY THE
J. D. FATE CO



STRIPPING

in the most economical way is accomplished with the light weight self-contained

Cloverleaf Double Drum Hoist

GASOLINE or ELECTRIC POWER

Outfit operated with 2 men will easily save from 5 to 6 teams and drivers. Saves you moving your heavy excavating machinery, when they ought to be digging products.

Operation Expense at Minimum *Write for Catalogue*

CLOVERLEAF MACHINE CO.

SOUTH BEND **INDIANA**

We're Ready

to meet your requirements in full for high grade

Track Equipment

A complete line of frogs, switches, crossings, crossovers, switch stands, etc.

Ask for Catalog 103

The CINCINNATI FROG & SWITCH COMPANY

TRACK EQUIPMENT FOR STEAM AND ELECTRIC RAILROADS LIVE OAK AND MILLS

CINCINNATI, O.

News of the Companies

W. E. Meadwell, advertising manager of the Morse Chain Company, Ithaca, N. Y., has been appointed to a like position with the Chas. A. Schieren Company, New York.

G. E. Land has been appointed advertising manager of the Blaw Steel Construction Company, Pittsburgh. He was formerly in the advertising department of the National Tube Company.

The Wolverine Sand and Gravel Co., Detroit, Mich., have increased their capital from $30,000 to $40,000.

The Arkansas Lime Company at Ruddells, Ark., is contemplating the erection of a plant to grind glass sand. Three new glass factories at Fort Smith, Ark., offer a market for the product.

The Mackinaw Sand and Gravel Co., having plants at Mackinaw and Chillicothe, Illinois, will increase their capital stock to $100,000 and change their name to the McGrath Sand and Gravel Co. The directors of the company are J. W. McGrath, T. E. McGrath, T. L. Blackburn, Fred W. Longlan and Dean Hill, all of Lincoln, Ill. Two new plants, designed by Raymond W. Dull & Co., of Chicago, will be built at Pekin and Forreston, Ill.

The Empire Land Company of Savannah, Alabama, are opening an 800-acre gravel pit near North Montgomery, Ala.

The Montezuma Gravel Co., capitalized at $12,000, will have its offices in Terre Haute, Indiana. The company will deal in sand, gravel, clay, shale, stone, coal and other minerals.

The Cazanovia Sand and Gravel Corporation, Elmira, N. Y., has been incorporated for $25,000, to quarry stone, sand, gravel, etc.

The Delevan River Quarry and Construction Co. have moved from 26 Exchange Place, Jersey City, to 21 Bridge street, Lambertville, N. J.

Getting More Out of Your Equipment

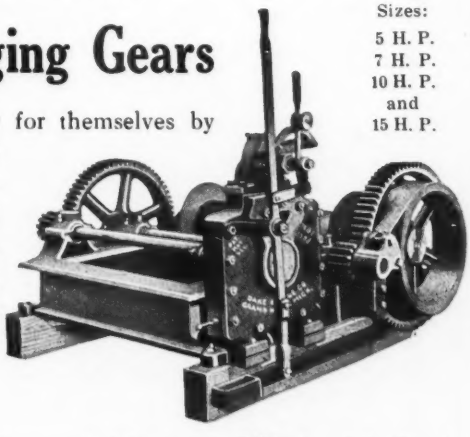
It's the time you save—the up-keep expense you eliminate—the *Service* you get that counts.

Made Either Right or Left Hand

Sizes:
5 H. P.
7 H. P.
10 H. P.
and
15 H. P.

DAKE Swinging Gears

are built for service and pay for themselves by speeding up the work of any bull wheel derrick. The reversible engine, with no dead centers, and simple, single-lever control makes quick, accurate spotting of the load possible.



Write us for particulars, and ask any user.

Dake Engine Co., Grand Haven, Mich., U. S. A

54 holes, average depth 92 ft., fired by means of Cordeau-Bickford Detonating Fuse

CORDEAU-BICKFORD

An Instantaneous Detonating Fuse for

SAFETY and EFFICIENCY

Particularly adapted to well drill shooting where large columns of explosives are fired, where it is desirable to break the charge in the drill hole, or where a great many holes are to be fired at one time.

Cordeau is run from the top to the bottom of the drill hole in contact with the explosive charge—one continuous detonator.

RESULTS: Complete detonation, quicker detonation, greater shattering effect, lower secondary costs, substitutes a detonator which is insensitive to shock and friction in place of the electric caps.

Write for Cordeau Booklet and Deep Well Blasting

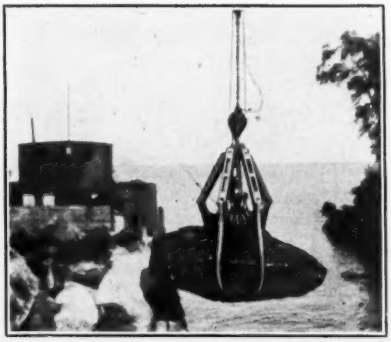
THE ENSIGN-BICKFORD COMPANY

Original Manufacturers of Safety Fuse

Established 1836

SIMSBURY, CONNECTICUT

Powerful Stone Grapple

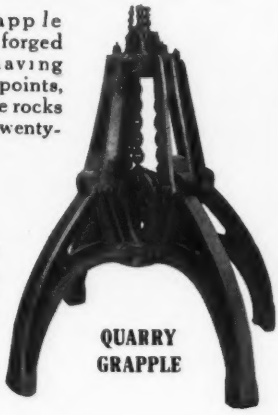


Used by Contractors on the

GREAT LAKES

In Building Breakwaters

This Grapple built with forged fingers having tool steel points, will handle rocks up to twenty-five tons.



QUARRY GRAPPLE

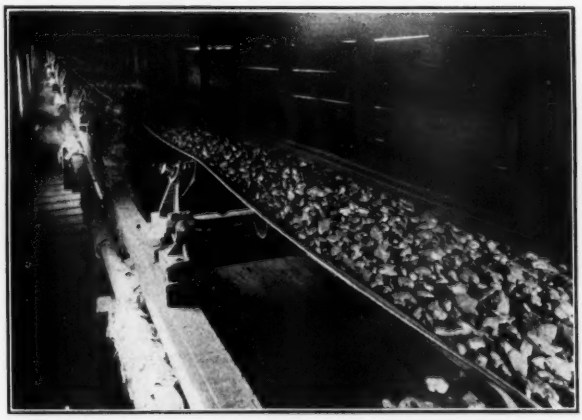
THE QUARRY GRAPPLE

has capacity for a six or seven ton rock. Designed for use in stone quarries for picking up larger size stones. Hasmanganese steel castings or calks at lower extremties of the fingers, made separate and renewable.

Built by

Superior Iron Works Co.

SUPERIOR, WIS.



For Driving and Conveying

"V-B"-Belt

White Seal Belt

Ampere Canvas Belt

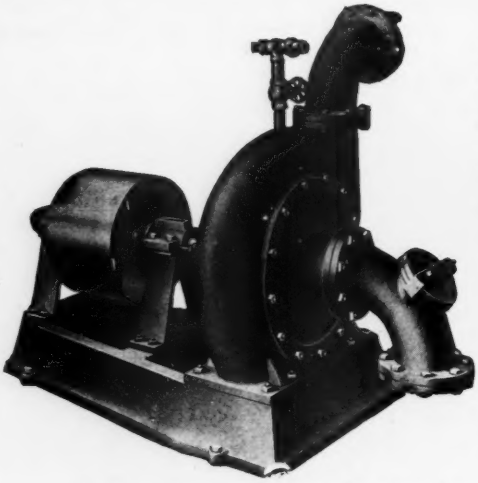
Write

Victor-Balata & Textile Belting Co.

Manufacturers of { "V-B" (Victor Balata) Belt; "WHITE SEAL" "AMPERE" and "SPECIAL" Grade Canvas Stitched Belting }

Main Sales Office: 38 Murray Street, NEW YORK, N. Y.

BOSTON	CINCINNATI	CHICAGO	FACTORY
27 High Street	212 E. 2nd St.	167 N. Market St.	Easton, Pa.



For handling sand, gravel, and other solids in suspension at a minimum cost, use

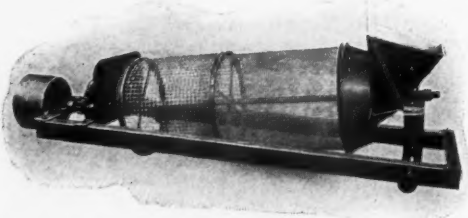
Erie Sand-Gravel Dredging Pumps

Small sizes as well as largest ones are designed to give maximum output and greatest wear for a given weight.

Tell us your conditions giving total vertical lift with length of pipe line and ask for Bulletin P-30

ERIE PUMP AND ENGINE WORKS

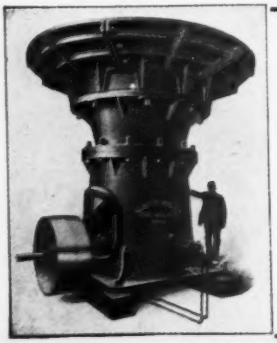
Formerly of ERIE, PA. MEDINA, N. Y.



MATERIAL SCREENS

If you have material to screen, it will pay you to learn more about S. & S. Screens, write, giving us an idea of your requirements and we will do the rest.

CEMENT TILE MACHINERY CO. - - 250 Rath St., Waterloo, Iowa



AUSTIN GYRATORY CRUSHERS

Made in Eight Sizes
From 50 to 5,000 Tons
daily capacities.

AUSTIN MANUFACTURING CO.
CHICAGO

Just Like Comets

Advertisements

Carry vivid tales that tell of

BUSINESS PROGRESS

An Observer Looking "Through" PIT AND QUARRY

Educationally, advertisements are concise statements of the most skillful application of the best ideas of the times.

Through

Pit AND Quarry

you may discern the signs of the times.

Read the "Ads

KEEP UP WITH YOUR MARKET

You can't whittle a peg to fit a hole *you've never measured!*

Neither can you produce sand, gravel or crushed stone as aggregate for the *Concrete Industry* if you *don't know* exactly what it needs. * * * The standards for aggregates are always changing. To get a *bigger market*—get a *bigger knowledge.* The Concrete Industry is growing—its demands for sand, gravel and crushed stone are increasing. * * * Is *your output* increasing?

THE CEMENT ERA is the "Panorama of Progress" in the concrete industry. It will show you *bigger opportunities* for *bigger profits.*

Below are listed concrete products that you can profitably manufacture with your materials as a side line, especially as a winter activity. Check and sign the blank below, and, in addition to THE CEMENT ERA, we will send you other miscellaneous literature pertaining to the lines marked.

THE CEMENT ERA 1917
538 South Clark Street, Chicago

I want you to enter my subscription to THE CEMENT ERA for one year, and until forbid, for which I agree to pay at the rate of $1.50 per year upon receipt of bill.

Individual Name.....

Name of Company.....

Address.....

Business .....

....Silo Staves
....Sectional Culverts
....Building Blocks
....Ornamental Concrete Produets
....Fence Posts
....Sewer Pipe
....Cement Bricks
....Water Tanks
....Columns and Capitals
....Drain Tile
....Burial Vaults
....Roofing Tile
....Sills and Trimmings

ECONOMICAL EXCAVATING

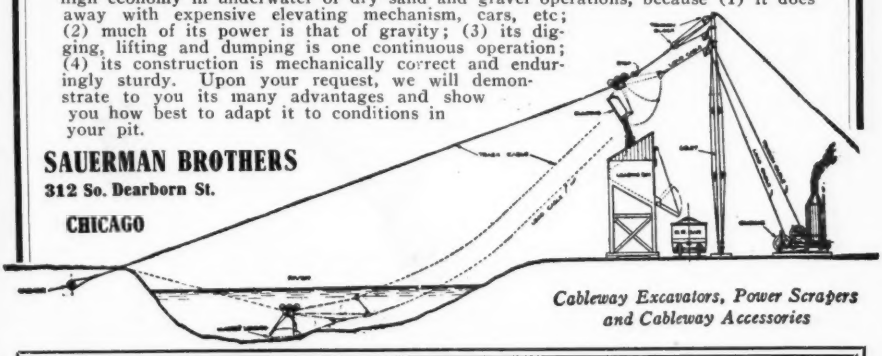
of Sand and Gravel

is best accomplished with

SHEARER & MAYER DRAGLINE CABLEWAYS

Not least among the advantages of this outfit, is its adaptability to almost any conditions. Six years of successful operation have established it as a machine of high economy in underwater or dry sand and gravel operations, because (1) it does away with expensive elevating mechanism, cars, etc; (2) much of its power is that of gravity; (3) its digging, lifting and dumping is one continuous operation; (4) its construction is mechanically correct and enduringly sturdy. Upon your request, we will demonstrate to you its many advantages and show you how best to adapt it to conditions in your pit.

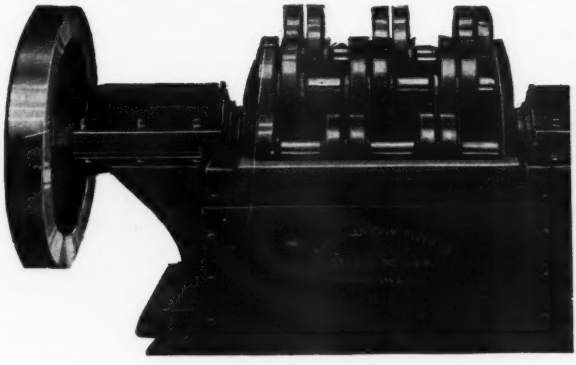
SAUERMAN BROTHERS
312 So. Dearborn St.
CHICAGO



Cableway Excavators, Power Scrapers and Cableway Accessories

TWICE THE POWER TRANSMITTED BY THE BELT!

Built Stronger, Lasts Longer

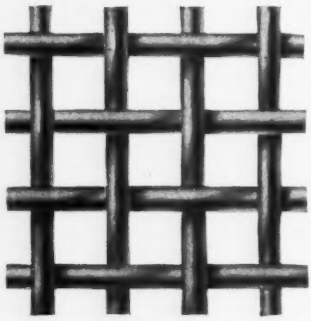


"The Ring "is the "Why"

All crushing and grinding parts are of Manganese Steel. Chilled iron liners 1¾ inches thick. Shafts, 5 inches diameter. Discs removed from grinding room of machine. SPEED, 600 R. P. M. Two years' operation without one penny for repairs is one company's record.

For Pulverizing Sandstone, Gypsum, Shale, Slate, Slag, Glass Cullet, Terra Cotta, Phosphate Rock, Limestone, etc. Made in six sizes. *Write for catalog and estimates.*

AMERICAN PULVERIZER CO., East St. Louis, Ill.



2½ Mesh; 105 Wire

CLEVELAND
DOUBLE-CRIMPED
WIRE CLOTH

Renowned for its Uniformity, its Superior weave, its Durability.
Especially adapted for SAND and GRAVEL Screens.
A large stock of the various meshes always on hand.

Prices right—Catalog on request

THE CLEVELAND WIRE CLOTH & MFG. CO.
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PERFORATED METALS and SCREENS OF ALL KINDS
MATERIAL IN STOCK
PROMPT SHIPMENT
Chicago Perforating Co
2445 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.

AIR COMPRESSORS

All makes, types and sizes, steam and power driven and for various pressures, guaranteed condition. Some are factory repaired. **Twenty years' experience with compressed air apparatus at your command.** Send me your inquiries.
George S. Githens, 6 Beacon Street, Boston, Mass.

WE WANT AT ONCE
for our own use, a 15, 20, 25, 30 or 35 ton
LOCOMOTIVE CRANE
Would take crane that needs repairing. Will trade 10-ton Industrial in part. Prefer long boom and outriggers.
INDUSTRIAL SERVICE COMPANY, Lincoln, N. J.

Perforated Metal Screens
FOR STONE, SAND, GRAVEL, ETC.

Plates flat; rolled to diameter or radius for revolving and conical screens butted or lap joints

Elevator Buckets
in all styles and sizes

HENDRICK MFG CO., 39 Dundaff Street CARBONDALE, PA.

WHATEVER YOU NEED IN PERFORATED METALS

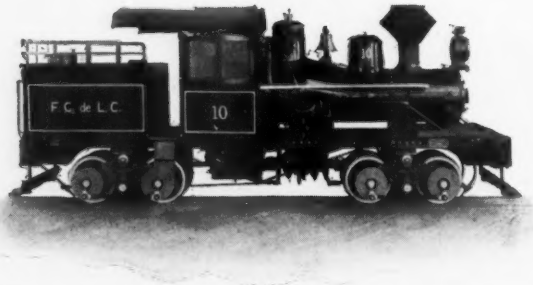
There is no branch of the sand, gravel and crushed stone industry for which we cannot furnish the highest quality of perforated metals and screens at rock bottom cost and immediate deliveries.

NORTMANN-DUFFKE FDRY. CO., Milwaukee, Wis.

PROMPT

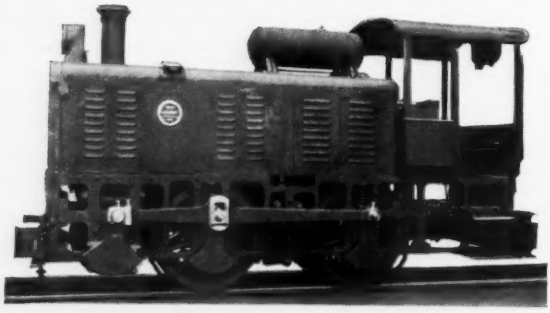
DELVERY

Heisler Geared Locomotives



Do you realize what the Heisler Geared Locomotive can do with its all steel, flexible swivel trucks and center shaft drive; short rigid wheel base, load equally distributed on all wheels; all wheel drivers, each driver having eight impulses of engine to each revolution? This means efficient service on uneven tracks, sharp curves, steep grades; saves in track construction and maintenance. Has a record of always being on the track and ready to start a load quickly. Has many decided advantages over the direct connected or gasoline locomotives for pit and quarry operations. It will pay you to investigate this locomotive for your service. Built in all sizes and gauges. Write today for all particulars.

HEISLER LOCOMOTIVE WORKS :: ERIE, PA.



Baldwin Gasoline Locomotives

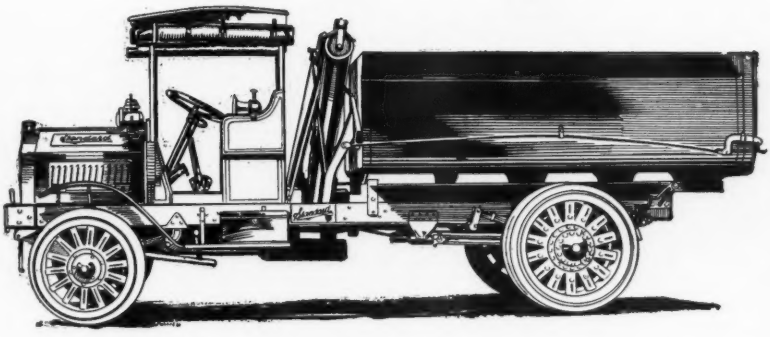
are suitable for work in quarries, industrial plants and construction service.

Full particulars will be furnished on request

The Baldwin Locomotive Works

Philadelphia, Pa., U. S. A.

Standard
MADE IN DETROIT USA



Check Up Costs On the Standard!

PUT the Standard at work for you on a "make good" basis.

Work it hard—give it the most trying service—keep it up day after day—

—then figure up the costs—all the costs—and see the extremely low expense per ton mile!

The result will show you why the Standard ia rapidly coming to the front —why 65% of our orders are from Standard owners.

It will also prove to your satisfaction the necessity of having your truck built strong in every feature—standard in every detail. You appreciate the value of Standardized Units.

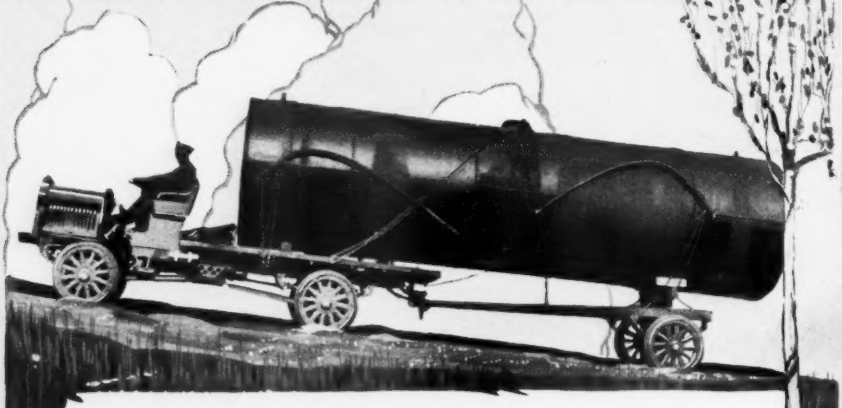
There is no question about the Standard Truck making good in your work. It is proving extremely satisfactory for many quarry and gravel pit owners. Day after day, year in and year out the Standard stays on the job doing a full day's work.

You shouldn't be satisfied with truck service less economical, less reliable than the Standard—because your business demands that you secure the most efficient delivery system.

Ask us for complete information regarding the Standard line. There is a Standard Truck built for your work.

STANDARD MOTOR TRUCK COMPANY
DETROIT, MICHIGAN

DUPLEX RESERVE POWER ASSURES DEPENDABILITY IN EXTREME EMERGENCIES



THE tremendous reserve power of the Duplex—the original 4-Wheel Drive 3½-Ton Truck—is applied four times more effectively than is possible with any other type of motor truck.

That is why the Duplex is known throughout the country—in industrial centers, logging camps, gravel pits, mining districts, deserts and oil fields—as a super-strength motor truck that hauls capacity loads anywhere.

One source of Duplex dependability under most adverse road conditions is found in the Duplex-Adler self-locking differential, which automatically throws the power to the wheel or wheels having traction.

Another source of Duplex effectiveness of reserve power lies in the range of gear reduction made possible with the Duplex Chain Case—an exclusive Duplex truck feature.

The Duplex Chain Case reduction practically doubles the power applied to the four wheels. It provides a tremendous leverage of 64 crankshaft turns to every revolution of each of the four wheels, and makes it possible for the Duplex to haul three and one-half ton loads under up-grade conditions that any rear-wheel truck would find difficult to negotiate when unloaded.

Our 1917 catalog explains in detail the many exclusive mechanical features of the Duplex, while our engineers will give you facts and figures for your particular business. If you would reduce your haulage costs to the absolute minimum, let us send you complete information about the Duplex—the truck that hauls capacity loads anywhere.

The Duplex 3½-Ton Truck, shown above, hauled this large oil tank over country roads a distance of nearly 30 miles. The tank is 7 feet in diameter, 28½ feet long and weighs 8½ tons. The Duplex hauled its burden through sand and mud and up steep hills, and clearly demonstrated that it is equal to any hauling emergency.

ADDRESS ALL COMMUNICATIONS TO DEPARTMENT 137

DUPLEX TRUCK COMPANY

LANSING, MICHIGAN

DENBY
MOTOR TRUCKS

Capacities;
1 Ton
to
3 Tons

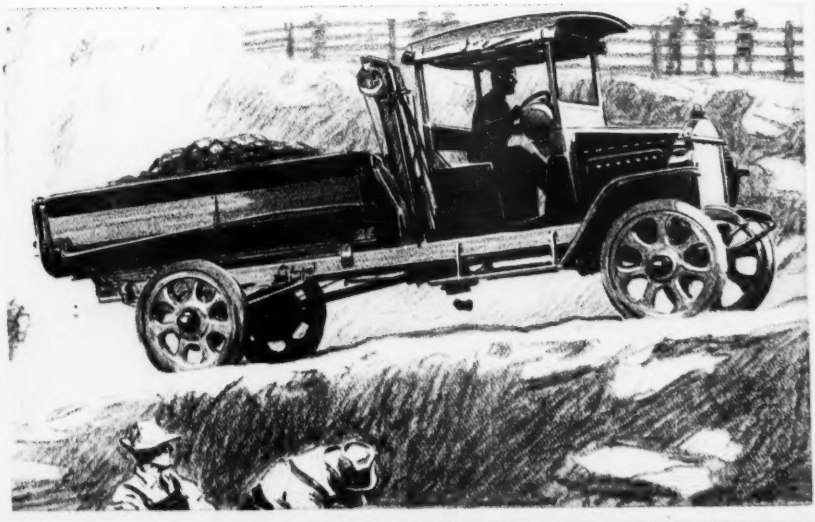
The internal-gear axle as developed in the Denby provides a truck which it is almost impossible to "stick," even under the hardest road and load conditions. Its most remarkable showing is made when the truck gets off the paved streets.

The internal-gear, too, loses none of its efficiency under the constant friction of slow-speed work. This means that it is particularly well adapted to use with trailers; and trailers properly used add greatly to the economy and efficiency of your delivery.

We maintain a special department at the factory which is equipped to give you full information on hydraulic-dump, inertia-dump and other types of body suited to your work, as well as trailers.

Denby Motor Truck Company

Dept. G **Detroit, Mich.**



GREAT QUARRY EQUIPMENT SALE

All Kinds of Quarry Machinery of Recent Make and in Good Condition. Channeling Machines, Rock and Plug Drills, Quarry Bars, Air Compressors and Receivers, Surfacing Machines and Drill Sharpeners. Derricks and Hoisting Engines, Boilers, Engines and Pumps, Stone Crushing Plants.

We have prepared an eight (8) page list of the above equipment. There are over 1,200 big bargains. If you contemplate buying any machinery at this time, you may secure prompt delivery and a material saving in cost by sending for the list.

H. S. KERBAUGH, Incorporated
ENGINEERS—CONTRACTORS
6 Church Street **NEW YORK CITY**

Load Bore Holes With
Red Cross Extra
The Universal Explosive

Red Cross Extra Dynamite is a Low Freezing, all-the-year-'round, high efficiency explosive especially

Adapted to Quarrying

It is made in all standard strengths from 20 to 60% and guaranteed to be as represented by cartridge markings.

Red Cross Extra Dynamites are as strong, stable and efficient as any other standard explosive.

If no test of Red Cross Extra has been made, make one at once. It is the least expensive and most efficient explosive.

Tell us what kind of stone is being quarried to enable us to give practical blasting directions.

E. I. du Pont de Nemours & Co.
Wilmington, Delaware

POWDER MAKERS DU PONT SINCE 1802

FOR SALE
ROCK DRILL
12 2¾-inch Ingersoll Rock Drills refitted cheap.

Vertical Boilers
Refitted Steam Pumps
and Engines
GENERAL MACHINERY

Wm. Ellison & Sons Manfg. Co.
1018-20 West 6th Street
ST. LOUIS, MO.

For Rent or For Sale

(Rental to be applied on purchase if so desired)

DRAG LINES

1—Model 220 Marion, can be equipped for revolving stripping shovel, shop number 2840. (Has moved about 350,000 yds.)
1—Class 14 Bucyrus, shop number 720, 60 ft. boom, 2-yd. Page bucket.
1—3 T Monighan, shop number 205, latest walking device, 70-ft. boom, 3½-yd. special Page bucket, equipped with lighting plant, built new in 1914.

STANDARD STEAM SHOVELS

70 C Bucyrus (Massachusetts boiler), shop number 1445.
70 C Bucyrus, shop number 1246.
70 C Bucyrus, shop number 1287.
45 C Bucyrus, shop number 1297.
45 C Bucyrus, shop number 1202.
Standard 70-ton Bucyrus, shop number 984.
Standard 70-ton Bucyrus, shop number 868.
Standard 70-ton Bucyrus, shop number 733.
1 Class F, 45-ton Vulcan.

BOILERS—Upright Type

6—20 hp.
1—15 hp.
2—12 hp.

PLOWS

2—Marion side plows—one right and one left, shop numbers 1523 and 1525.

DRILLS

Ingersoll-Rand steam drills.
2—gas Sparta, non-tractor drills.

PUMPS

1—4½ x 2¾ Pratt Duplex.
1—4½ x 2¾ x 4 Snow.
1—4½ x 3¾ x 4 Fairbanks.
1—7 x 4 x 8 American.
1—3½ x 2 x 3 Prescott.
1—Emerson deep well.

CARS—Dump

16—12-yd. standard gage Western air dump.
12—6-yr. standard gage dump (no air).
3 and 4-yd., 36-in. gage.
1½-yd., 24-in. gage.
12—heavy duty, 4-yd., Western 36-in. gage dump cars.

REVOLVING TRACTION SHOVEL

Model 28 Marion (Ohio boiler), shop number 3235.
1—No. 0 Thew (butt joint boiler), shop number 702.

CABLE

5 coils of 1¼ Roebling steel cable, 40% off list.
1—reel (510 ft.) 1¼ Roebling steel wire, as good as new.

BUCKETS

1—2½-yd. Page drag line.
1—2½-yd. Bucyrus shovel bucket.
2—4-yd. Bucyrus shovel buckets.
1—1-yd. Clam Shell.
1—¾-yd. Clam Shell.
1—1-yd. Page Bucket.

LOCOMOTIVES

2—15 x 20 standard gage, saddle tank locomotives.
36-in. gage, 10-in. x 16-in., 18-ton, long tank, late model.

Vulcan

3—Shop number around 1500.

Davenport

1—Short saddle tank, shop number around 1000.
3—7-in. x 12-in., 24-in. gage, shop numbers 421, 1203, 1310.
2—Late model, long tank, shop numbers 1133 and 1134.

SPREADER CARS

1—Standard Western spreader.
1—36-in. gage Oliver.

BOILERS—Locomotive Type

1—100 hp.
1—40 hp. Nagel, practically new.

HOISTING ENGINES

1—10-in. x 12-in., double drum, cableway Lidgerwood, with boiler.
1—20-hp. Rumley traction engine.

SHEET PILING

72 pcs. Jones & Laughlin, 18 ft. long by 12 in. wide.

All of the above for immediate delivery.

Owned by us and sold under absolute guarantee of condition. Above equipment located at our yard at Clyde, Cook Co., Ill., a suburb of Chicago.

Clapp, Norstrom & Riley

12 and 14 South Canal Street
CHICAGO, ILLINOIS

Northwestern Branch: 1308 Pioneer Building
ST. PAUL, MINN.

Second-Hand Machinery

BUCKETS

1 ¾-yard Hayward clam-shell.
1 1-yard Williams clam-shell.
1 1½-yard McMyler clam-shell.
1 1-yard Orange-Peel bucket.
1 1-yard Page drag-line Bucket.
1 2-yard Page drag-line Bucket.
1 1-yard slack-line outfit complete.

COMPRESSORS

1 Ingersoll-Rand Imperial type X-B-2, cap 2,400 ft., belt-driven.
2 Ingersoll-Rand, 2-stage, cap. 650 ft., without motors.
1 14x12 Laidlaw-Dunn-Gordon belt-driven machine.
1 Sullivan 2-stage steam-driven, cap. 550 ft.
1 Sullivan 2-stage steam-driven, cap. 1,800 ft.

CRANES

1 15-ton 4-wheel McMyler, 44 ft. boom, 1½-yard clam-shell bucket.
1 15-ton 4-wheel Browning, 40 ft. boom, 1½-yard bucket.
1 15-ton 8-wheel Browning, 45 ft. boom, 1½-yard bucket.
2 15-ton McMyler Whirlies, 14 ft. gauge, 45 ft. boom.

DRAG-LINES

1 class 14 Bucyrus, 65 ft. boom, 2½-yard bucket.
1 No. 2 Monighan, 65 ft. boom, 2½-yard bucket.
1 Page drag-line, 50 ft. boom, 1-yard bucket.

CARS

30 4-yard Western 36 in. gauge cars.
35 1½-yard Western 24 in. gauge cars.
20 12-yard Western standard-gauge cars.
30 2½-yard 36 in. gauge quarry cars.
50 80,000 lbs. capacity, gondolas.
30 60,000 lbs. capacity, gondolas.

HOISTING ENGINES

2 3-drum 8¼x10, with or without boilers.
2 7x10 D. C. D. D. hoists.
1 6¼x18 D. C. D. D. hoist with boiler.

CRUSHERS

1 No. 3 Austin.
1 No. 3 Gates.
1 No. 4 Austin.
1 No. 5 McCully.
1 No. 5 Austin.
1 No. 6 Gates, style "K," complete plant.
1 No. 8 Gates "K" crusher.
1 No. 7½ Austin, complete plant.
1 No. 12 Gates.
2 18x36 Jaw Crushers.

LOCOMOTIVES

2 10x16 36 in. gauge dinkies, just through shop.
3 9x14 36 in. gauge, just overhauled.
1 7x12 24 in. gauge, almost new.
1 10x18 standard-gauge dinkies, fine.
2 19x24 6-wheel 50-ton switcher.
1 20x28 10-wheeler, good as new.
6 18x24 Moguls, first-class.

STEAM SHOVELS

1 No. 1 Thew Traction Shovel, 1-¼-yard, first-class.
1 No. 0 Thew Shovel, first-class.
1 No. 2 Thew, on railroad trucks.
1 Model "41" Marion st. gg. trucks.
1 Model "60" Marion, 2½ yard dipper.
1 Model "61" Marion, extra-high boom.
1 70-ton Bucyrus, first-class.

RAIL

200 tons 40 lbs. good relayers.
1,200 tons 56 lbs., good relayers.

MISCELLANEOUS

2 No. 6 Nye Pumps.
1 No. 6 Cameron Pumps.
1 10" Morris Centrifugal.
20 Steam Drills, various makes.
1 Holt Caterpillor Tractor.
1 10-ton 3-wheeled roller.
1 8-ton Tandum roller.
3 32"x10 screen.
2 40 x14 screen.
2 48 x16 screen.
1 60 x20 screen.

Machinery Warehouse & Sales Co.

Successors to Geo. C. Marsh Co.

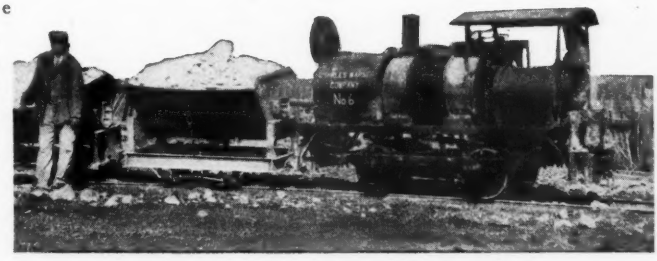
744 Old Colony Bldg. Chicago

INDEX TO ADVERTIZERS.

American Pulverizer Co..... 51
Atlas Powder Co..... 7
Austin Mfg. Co..... 48
Baldwin Locomotive Works..... 54
Ball Engine Co..... 16
Bell Locomotive Works..... 61
Blaw Steel Cont. Co..... 40
Bradley Pulverizer Co..... 12
Brainard Pulverizer Co..... 12
Burton Powder Co..... 3
Burch Plow Works..... 62
Caldwell & Son Co., H. W..... 38
Cement Tile Machy. Co..... 48
Clapp, Norstrom & Riley..... 59
Cleveland Wire Cloth & Mfg. Co..... 52
Cloverleaf Machine Co..... 44
Charter Gas Engine Co..... 15
Chicago Perforating Co..... 52
Chalmers & Williams..... 2
Cincinnati Frog & Switch Co..... 44
Dake Engine Co..... 45
Denby Motor Truck Co..... 57
Donahue & Co..... 43
Duplex Truck Co..... 56
du Pont de Nemours & Co., E. I..... 58
Easton Car & Const. Co..... 9
Ellison & Sons Manfg. Co..... 58
Ensign-Bickford Co..... 46
Erie Pump & Engine Works 48
Excavating & Screening Machy. Co.... 63
Fate Co., J. D..... 42
Githens, Geo. S..... 52
Heisler Locomotive Works..... 54
Hendrick Mfg. Co..... 53
Hercules Powder Co..... 6
Hummelstown Brown-Stone Co..... 43
Ideal Engine Co..... 14
Industrial Service Co..... 52
Jeffrey Mfg. Co..... 64
Kelty, T. A..... 43
Kerbaugh, H. S..... 58
Mansfield Engr. Co..... 16
Machinery Warehouse & Sales Co..... 60
Morris Machine Works..... 8
Nortmann-Duffke Fdry. Co..... 53
Owen Bucket Co..... 11
Oxweld Acetylene Co..... 5
Ridgeway, J. A..... 43
Sauerman Bros. 51
Sellar Supply Co..... 4
Spalding Quarry Co..... 43
Stephens-Adamson Mfg. Co..... 36
Standard Motor Truck Co..... 55
Superior Iron Works..... 47
Traylor Engineering & Mfg. Co..... 13
Universal Crusher Co..... 15
Victor-Balata & Textile Belting Co..... 47
Williams Co., G. H..... 10
Williams Patent Crusher & Pulv. Co..... 62
Worlock Stone Co..... 43

Keep Your Equipment Going

You make money when you keep your equipment going. You'll earn most with equipment that will wear a long while and is easily and quickly repaired. This applies particularly to



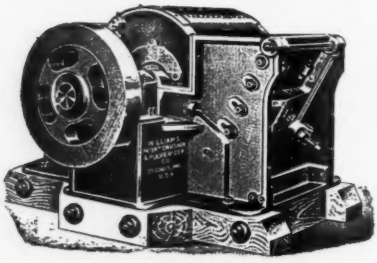
BELL LOCOMOTIVES

Bell Locomotives burn kerosene, the cheapest possible fuel you can buy, but still pulls a 50% greater load. You don't have to have a licensed engineer, either.

Write for full information.

BELL LOCOMOTIVE WORKS, Inc., 30 Church St., NEW YORK, CITY

FROM 14" TO 18" CUBES TO 1½"- 1"- ¾"- ½" IN ONE OPERATION



BY using Williams Jumbo Crushers to take the feed from the very large Gyratory Crushers, the smaller or intermediate crushers, which were formerly necessary, can be eliminated as the Williams Jumbo Crusher will reduce these large cubes ranging in size from 14" to 18" to a product either 1½"-1"-¾" or ½". Capacities from 60 tons per hour to 200 and 300 tons per hour. Complete description of this extraordinary crusher is given in

BULLETIN NO. 85

THE WILLIAMS PAT. CRUSHER & PULVERIZER CO.

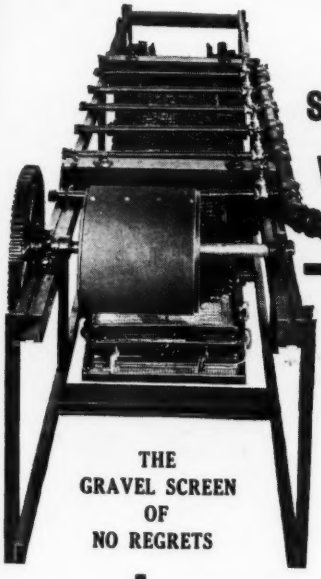
Gen'l Sales Dept., Old Colony Bldg.,

CHICAGO

A CU. YD. A MINUTE FROM STONE CAR TO WAGON WITH THE "BURCH"

One user of Burch unloaders even reports four loads in three minutes! One minute per load is everybody's average. You can see that there are no waiting wagons at that rate; and it rids you of shovelers' wages. It's practical, strong and rapid and easy to operate. A hauler designed it, and haulers are enthusiastic over it. Simple, compact, and reasonably priced. Write us for particulars—today.

THE BURCH PLOW WORKS COMPANY, Crestline, O.



THE
GRAVEL SCREEN
OF
NO REGRETS

SCREENING AND WASHING FOR LESS THAN 1C PER YARD

1c a yard is the figure at which an actual commercial plant turned out 60 yards per hour of perfectly graded and clean sand and gravel of five different sizes. In the plant shown below, the E & S Shaker Screen with washer attachment replaced a $30,000 outfit of a different make, part of which still standing is shown on the left of the photo.

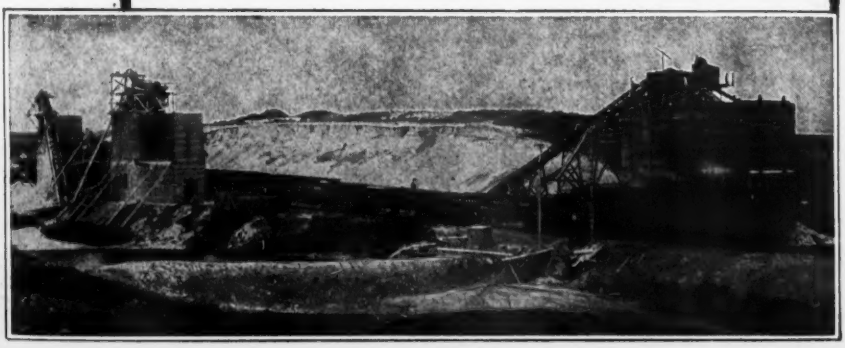
E & S SHAKER SCREEN WITH WASHER ATTACHMENT

is simply the latest of the great efficiency and economy inventions that are bound to develop from time to time in every industry. It has been in practical use for 6 years. It has proved its distinctive merit beyond question. Exactly eccentric motion gives the screens a decided "throw," thus turning out more material at less cost than any other outfit of the same capacity.

There are a score of reasons, every one vital, to you, why you should give the E & S screening outfit your immediate and careful investigation. Start it out by dropping us a line of inquiry today.

WE
DESIGN
COMPLETE
PLANS

The EXCAVATING & SCREENING MACH. CO.
748 SECURITY BLDG., MINNEAPOLIS, MINN



There's Where Your Profits Go—

IF YOU ARE BUYING THE SERVICES OF MORE THAN ONE MAN

To Load Your Crushed Stone, Sand and Gravel or Coal to Wagons or Trucks, you are wasting money that can be turned into profits.

One Man and a Jeffrey Self-Propelling Wagon and Truck Loader Will Load a 5-Ton Truck in 4 to 6 minutes. To Hand-Shovel the same load, it would require 5 men 20 to 25 minutes.

Considering the high-cost of labor, can you meet the competition of others who are loading materials at one-fifth of your present cost.

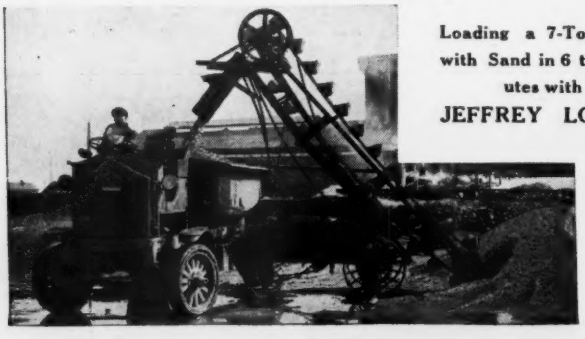
Let up prove our claims to you as we have to scores of others. Bulletin 177-E will be sent to you upon request.

Address Wagon and Truck Loader Dept.

THE JEFFREY MFG. CO.

990 North Fourth Street. Columbus, Ohio

Originators of the Self-Propelling Loader



Loading a 7-Ton Truck with Sand in 6 to 8 minutes with a JEFFREY LOADER